Socio-economic Study of the Space Sector in Portugal

Final report

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NOVASPACE

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Abbreviations and acronyms

AI	Artificial Intelligence
ANACOM	Autoridade Nacional de Comunicações
ASC	Atlantic Spaceport Consortium
AIS	Automatic Identification System
ATV	Automated Transfer Vehicle
Bn	Billion
CAE	Classificação Portuguesa de Actividades Económicas
EC	European Commission
EGNOS	European Geostationary Navigation Overlay Service
EMSA	European Maritime Safety Agency
EO	Earth Observation
ESA	European Space Agency
ESO	The European Organisation for Astronomical Research in the Southern Hemisphere
EU	European Union
EUSPA	European Union Agency for the Space Programme
EuRoC	European Rocketry Challenge
FCT	Fundação para a Ciência e a Tecnologia
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
GEO	Geo-stationary Orbit
GNC	Guidance, Navigation, and Control
GNSS	Global Navigation Satellite System
GVA	Gross Value Added
H2020	Horizon 2020
HE	Horizon Europe
ICT	Information and Communication Technologies
I/O	Input/Output
ISIC	The International Standard Industrial Classification of All Economic Activities
IT	Information Technology
ISAM	In-Space Assembly and Manufacturing
LEO	Low Earth Orbit

MEO	Medium Earth Orbit
ML	Machine Learning
Mn	Million
NACE	Statistical classification of economic activities in the European Community
NASA	National Aeronautics and Space Administration
PASO	Pampilhosa da Serra Space Observatory
PRR	Plano de Recuperação e Resiliência (Recovery and Resilience Plan)
R&D	Research and Development
SAM	Social Accounting Matrix
SAR	Synthetic Aperture Radar
Satcom	Satellite Communications
SDA	Space Domain Awareness
SSA	Space Situational Awareness
STM	Space Traffic Management
USD	United States Dollars
VDES	VHF Data Exchange System

Key definitions

To ensure conceptual clarity, this section defines the key terms underpinning the economic analysis.

Term	Definition
Demand (or total demand)	The total requirement for goods and services in the economy, consisting of both final demand and intermediate demand.
Direct Effect	The initial change in economic activity caused by an event, such as new production or spending by producers or consumers due to a specific policy, investment, or project. These expenditures are applied to Input-Output multipliers to estimate broader impacts.
Employment	The model defines employment as an industry-specific, seasonally adjusted annual average that includes full-time, part-time, and seasonal jobs, consistent with BEA and BLS standards. Total employment combines wage-and-salary workers with proprietors, including self-employment, government, and military jobs. Reported as a headcount rather than full-time equivalents, jobs are measured by duration (e.g., one 12-month job equals two 6-month jobs), and individuals may hold multiple jobs.
Event	An event represents a specific economic activity or transaction occurring within the local economy being analysed.
Final Demand	Expenditures on goods and services that are not used in further production. This includes household consumption, government consumption, capital investment, additions to inventory, and exports, less the value of imports and sales by institutions.
Gross Value Added (GVA)	A measure of the value contributed by each industry to the economy. GVA = Output − Intermediate Consumption
Indirect Effect	The economic activity generated through supply chain purchases, i.e., business-to-business transactions that result from the initial (direct) spending within the region.
Induced Effect	The additional economic activity resulting from household spending of labour income earned in both the direct and indirect phases, after subtracting taxes, savings, and income earned by commuters. These effects capture the consumption-driven impact of increased employment and wages.
Industrial Classification Standards	Standardised systems used to classify industries based on the goods and services they produce. In Portugal, the CAE (Classificação Portuguesa de Atividades Económicas) is used, based on the European NACE classification. The model uses a sample of 46 disaggregated

Term	Definition
	industries derived from OECD classifications, which can be traced to NACE and subsequently CAE.
Industry	A group of establishments engaged in the same or similar types of economic activity, producing and selling goods or services.
Industry Revenue	The total income generated by an industry through the sale of goods and services. This includes revenues from final demand (e.g., consumer spending, exports) and intermediate demand (e.g., sales to other industries). Alternatively, looking at it from a production side, industry revenues include intermediate consumption and Gross Value Added (wages, taxes minus subsidies, profits).
Intermediate Consumption	The value of goods and services consumed as inputs in the production process, excluding fixed capital. It is subtracted from output to derive Gross Value Added (GVA).
Intermediate Demand	The demand for goods and services by industries as inputs into their own production processes.
Multipliers	Multipliers are rates of change that describe how a given change in a particular industry generates impacts in the overall economy. Output is the base Multiplier from which all other Multipliers are derived. The Output Multiplier describes the total Output generated as a result of 1 euro of Output in the target Industry. Thus, if an Output Multiplier is 2.25, that means that for every euro of production in this Industry, 2.25 of activity is generated in the local economy: the original euro and an additional 1.25. Multipliers can be Type I - Type I are representative of indirect effects, i.e., business to business purchases. Type II or type SAM - Type SAM Multipliers are representative of the induced effects, type II include the impact of Household spending and is the more commonly used Multiplier.
Output	The total value of goods and services produced by an industry. In the model, direct output is defined as revenue adjusted for changes in inventories. As the analysis spans a long period, the study assumes inventory changes are zero, and thus output equals revenues.
SAM	The model is built upon a Social Accounting Matrix (SAM), which extends traditional Input-Output (I/O) tables by including transactions not only between industries but also among institutions, capturing all monetary market flows. Although I/O and SAM can be used interchangeably, SAM provides a more comprehensive representation.

Executive summary

Since Portugal's accession as full member of ESA in 2000, an achievement built upon years of investment and concerted effort by different public and private stakeholders, the Portuguese space sector has gone through several key phases of development and achieved increasing international visibility. This has been recently spurred and supported by the adoption of the Portugal Space 2030 Strategy in 2018 as well as the creation of the Portuguese Space Agency in 2019. These initiatives set out clear objectives for strengthening the country's role in the global space economy, fostering innovation, and ensuring alignment with European priorities. In response, over the years, the space sector has grown from a relatively modest base into a dynamic contributor to innovation, employment, and international collaboration.

The period has also seen a notable **expansion of the Portuguese industrial base in space**. More than 150 entities are associated with space as of today, from start-ups to established firms either fully dedicated to space or branching out from adjacent sectors. The expansion of higher education courses and the creation of clusters have further facilitated synergies between academia, industry, and government, with Coimbra, Porto, and Lisbon emerging as key hubs for space-related activities.

Portugal's **contributions to the ESA programmes have increased**, enabling national companies and research centres to participate in larger, more strategic programmes. The participation in EU flagship programmes, such as Copernicus and Galileo, has also expanded, enabling technological know-how and credibility of Portuguese companies within the European ecosystem. Despite these advances, challenges remain, e.g., the small size of domestic demand, reliance on public funding, and small scale & fragmentation of actors, as shared in stakeholder consultations.

Portugal enacted a comprehensive space legal framework in 2019, later updated in 2024, introducing clear definitions, licensing rules, and oversight mechanisms. This framework provides legal certainty for national companies and creates an attractive and transparent environment for international companies. Considering the proposed and potentially forthcoming EU Space Act, **Portugal has a head start**. Nonetheless, despite ANACOM already partially filling this role with respect to licencing at least, adaptation may still be required, including the designation of a national authority to oversee compliance, adjustments to licensing and administrative procedures, and additional resources to manage increased regulatory workload.

Furthermore, a benchmark analysis with other countries showed that **Portugal retains a strong positioning** in regulatory development, growing launch capability, return from space, and national talent creation. Its space law places it well ahead of many comparable states, and its dedicated space agency is a key step that many countries have yet to take. However, in a continuously evolving context, work remains to be done, particularly to stimulate greater private investment and interest in the sector. Countries like **New Zealand and Sweden could be seen as key examples**, both having made the most of their unique geographic locations and launch capabilities to put themselves on the space map, while Spain shows the power of making space a cross-sectional government priority.

The study evaluated the economic impact of the Portuguese space sector since 2019. It estimated **a total economic output of €2.4 billion and support of ~4,447 jobs per year** (headcount including

direct, indirect and induced jobs) on average per year during the period analysed. Excluding intermediate consumption linked to other sectors, **space activities contributed €1.2 billion directly to national GDP**. The sector is strongly interconnected with the wider economy. For every euro directly added to GDP by space activities, **an additional €1.17 is generated through supply chains and household spending** (i.e., for an overall Type II Multiplier of 2.17).

The aviation and health & life sciences sectors were selected to provide a comparative analysis with the space sector. The findings indicate that, while the space sector currently contributes less to the Portuguese economy due to its smaller size and earlier stage of development, **its strong interconnections with other industries and the incomes it supports position it as a promising driver of long-term economic growth.**

More precisely, when comparing the Type II multiplier of the space sector with those of industries like agriculture and construction (2.01 and 2.80 respectively, compared to 2.17 for space as calculated by the study team), the study found that **space is well integrated into the broader economic fabric,** particularly through its supply chains and supported incomes. Additionally, cross-sector integration between the health & life sciences and space can significantly boost the growth of the latter, by leveraging the scale of health and life sciences sector. As suggested by the Type II multiplier recorded for space, **a growing space sector can benefit the entire Portuguese economy due to its strong ties with other sectors**.

Based on this analysis, **the study proposed strategic guidelines to support the development of the sector towards 2040**. First, the study highlighted Portugal's mission and vision within the space sector based on Portugal Space 2030 Strategy. Portugal's mission is to establish itself as a leader in the science and economics of Space–Earth–Climate–Oceans interactions, building on its Atlantic identity and maritime heritage to generate societal benefits. Its vision focuses on harnessing space applications and advanced technologies to create solutions at the intersection of Space and Earth, while fostering entrepreneurship, nurturing world-class talent, and cultivating global collaborations to deliver both societal and economic value.

Five strategic pillars are proposed to support the Portuguese space strategy: space applications; technology development; talent; innovation & entrepreneurship; and global collaborations. Additionally, six domains of focus are highlighted, including EO, satellite communications, access to space and space safety (including SST), space science & exploration (including astronomy and life sciences), emerging technologies (including AI, quantum, in-space assembly & manufacturing), and defence & security. Together, these **pillars and domains define Portugal's programmatic priorities**, guiding investments, partnerships, and national capabilities toward a competitive and sustainable space ecosystem.

For each domain of focus, the study identified key strategic opportunities and potential actions to strengthen Portugal's space sector. Future strategic opportunities include leveraging Portuguese clusters of excellence, deepening engagement in European programmes such as ESA, IRIS^2, and Horizon Europe, and expanding international partnerships to drive innovation and market access. In addition, the launch segment and emerging domains such as AI, and in-orbit manufacturing (incl. pharmaceutical research and advanced materials), present new avenues for growing Portuguese capabilities.

1. Introduction

Over the past decade, **Portugal has consolidated its position as a dynamic and forward-looking space nation**. This strategic repositioning is captured in the national space strategy, **Portugal Space 2030**, which sets an ambitious trajectory toward the country's integration into global space markets through innovation, public-private cooperation, and the democratisation of space access. Approved by the Council of Ministers (Resolution No. 30/2018), the **strategy outlines three core axes**: exploitation of space data and services, development of space infrastructure and systems, and capacity-building through research and education.

Anchored in these priorities, Portugal has expanded its participation in international programmes, built regulatory and institutional foundations, and fostered an increasingly competitive industrial base. National programmes, including the New Space Portugal, and launch infrastructure in the Azores, reflect a **clear ambition to combine Portugal's geographic, industrial, and academic assets** with European and global opportunities. Together, these initiatives signal a deliberate effort to grow the sector's economic impact while promoting innovation, sustainability, and international visibility.

As the European space community prepares for the **ESA Ministerial Council CM25 in November 2025,** Portugal faces a decisive moment. The ministerial council is expected to redefine programmatic priorities and funding envelopes for the next triennium. For Portugal, CM25 represents an opportunity: to consolidate achievements, articulate national strengths within the ESA framework, and identify priority areas where national capabilities can contribute most effectively to Europe's strategic autonomy and competitiveness.

In this context, assessing the **socioeconomic impact of the Portuguese space sector between 2019 and 2024 is not only timely but essential**. This study provides a data-driven post-assessment of the sector's performance, measuring the impact of key initiatives and offering evidence-based guidelines to strengthen Portugal's positioning in ESA, EU, and global programmes, while also demonstrating national returns to taxpayers, policymakers, and international partners. It further examines the Portuguese space ecosystem in comparison with peer countries at similar stages of development, identifying best practices. The study ais to ensure that Portugal is fully prepared for CM25 and equipped to maximise the benefits of its space strategy in the decade ahead.

2. Methodology

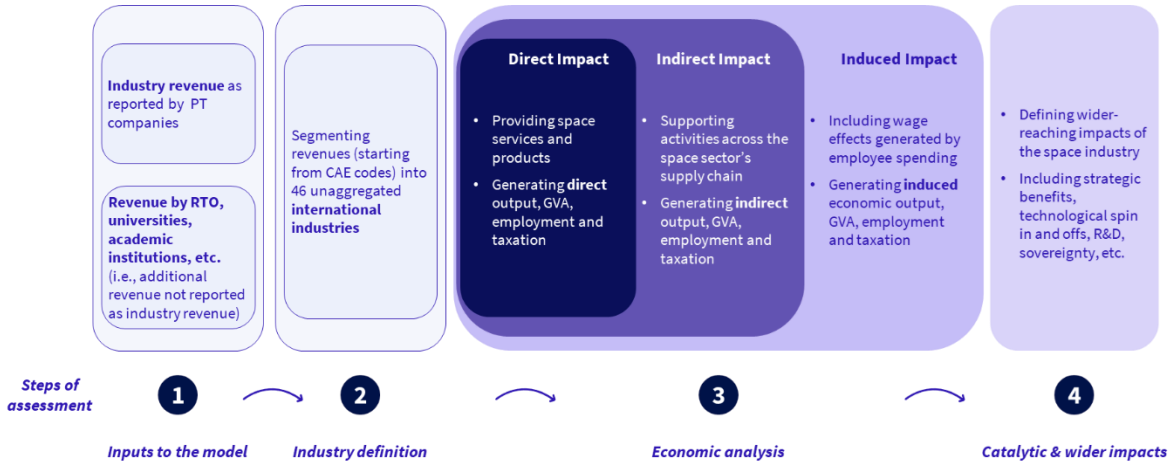
2.1. Approach

This chapter **describes the methodology used for quantifying the impacts of the Portuguese space industry as well as the translation into actionable recommendations**. First, it begins by outlining the key elements of the economic analysis, including data requirements and the definition of the space industry. Second, this chapter explains how the input/output (I/O) model was structured, then moving to address how broader catalytic impacts are be incorporated into the analysis. Finally, it covers the process used to pursue the stakeholder engagement, benchmarking of key comparable nations, and identification of strategic priorities for the future.

Specifically for the economic analysis, the study followed a structured sequence of steps:

- **Step 1 – definition of model inputs:** in this step the analysis compiled all available data to build a comprehensive overview of total inputs to the model related with the production of space products and services in Portugal (including industry revenue and research & technology organisations/universities/academic institutions revenue)
- **Step 2 – industry definition:** model inputs were segmented into relevant industries
- **Step 3 – economic analysis:** using an input/output (I/O) model, which captures the inter-industry relationships and intermediate consumption through Leontief inverse matrices (see Annex C for more details), the economic activity supported through direct, indirect and induced effects was estimated
- **Step 4 – catalytic and wider impacts:** finally, the analysis integrates effects catalysed by the space industry but not directly linked with market transactions. These impacts are qualitatively assessed including efficiency gains in other sectors, technological spillovers, and scientific advancements

Exhibit 1: Overview of steps for assessing economic impacts of the Portuguese space industry



This chapter also outlines the **methodology for stakeholder engagement**, which combines surveys & interviews with key Portuguese space companies and institutions, to capture qualitative insights and validate quantitative findings. It also details the **benchmarking approach**, which aims to contextualise Portugal's space performance & identify best practices by comparing indicators

with those of peer countries. Finally, the chapter presents the strategic priorities methodology, which translates the overall assessment into recommendations that informs policy choices.

2.2. Data gathering

2.2.1. Types of data

Data provided by Portuguese space stakeholders in relation to the period of interest includes:

- How much **revenues have been generated by industrial national players**
- How much money has been **spent by the government** in national space activities

These two figures act as key inputs for the model used to evaluate the Gross Value Added and employment of space activities in Portugal in the period assessed (2019-2024).

It is important to note that a within the total industrial revenues, a significant share is sales to government (e.g., revenues generated by Portuguese companies through ESA programmes, which are financed by Portuguese governmental budget for space). In order to avoid double counting of revenues in the inputs to the model, the study only takes industry revenues as reported by Portuguese companies, and add the share of government budget that acts as revenues for academic and research institutions (i.e., those entities that are not present in the list of 96 companies declaring revenues in the data provided to the study team).

The Portuguese government **directly supports certain space activities**, particularly research-intensive and early-stage technologies, as well as systems essential to national infrastructure and defence, through non-market institutions such as universities, military branches, and other public bodies. While these institutions operate outside commercial markets, they **contribute to the space sector in economically equivalent ways to industry participants**, for example by paying wages, procuring components, and supporting specialised talent and knowledge.

While accounting for both industry revenues and government investments, the analysis was careful in subtracting revenues linked with government's spending to **avoid double counting**.

The allocation of government budget is segmented as follows:

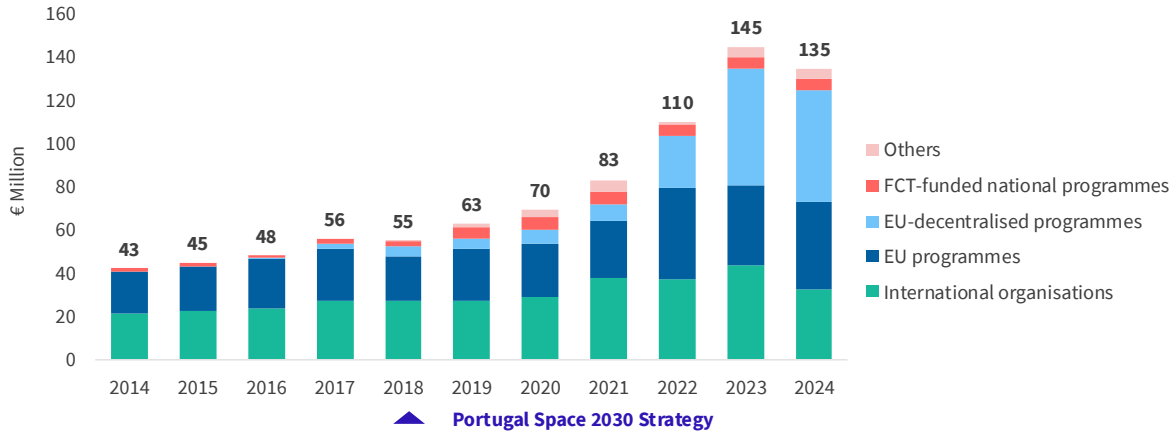
- **Budget to national industry** (accounted for in industry revenues, and therefore part of the inputs to the model)
- **Non-industry activities performed by the aforementioned research institutions that generate additional economic value** (added as inputs to the model)
- **Budget to international industry** (via EU and ESA-level programmes, and not contributing to economic activity in Portugal, and therefore not included as inputs to the model)

In the period of interest (2019-2024), €605 million were reported by the Portuguese Space Agency as total budget, as shown in Exhibit 2. Of these, €313 million were evaluated as representing government spending to non-industry activities performed by research institutions, which was added as inputs to the model. This amount covers funding to six key institutions (including EMSA, the Portuguese Space Agency, etc.) and 52 research centres, primarily associated with national

universities and advanced research institutions. Finally, the analysis also modelled **additional impacts generated by defence activities for in-house military services** not outsourced to industry. It estimated an additional €8 million from military activities over the period of analysis.

The remaining share of government budget (~€285 Mn) was identified as value already reflected in the industry revenue as reported by Portuguese companies, or representing budget spent via international programmes (e.g., EU) on international industry. This evaluation was the outcome of multiple reviews with the Portuguese Space Agency, and insights gathered from the stakeholder consultation.

Exhibit 2: Portuguese institutional investment in major space programmes



It is to note that government spending represents final demand, while industry revenue represents output (final + intermediate demand). As such, they were be input into the model through different I/O tables, as they represent different event types.

Revenues associated with export is automatically included in the event as third-party nations acquiring Portuguese space technologies or services are included within industry revenues. **Import expenditures** derived from government final demand are estimated through stakeholder interviews and then removed from the national demand as they don't generate economic activities in Portugal, but in the exporting nation.

In addition to the data used for the economic model, **contingent valuation data from the stakeholder consultation was incorporated** to assess and rank catalytic impacts. This involves asking key stakeholders to **score the perceived impact of their activities resulting from participation in the national space program**. These scores, combined with qualitative sources, help estimate the relative significance of different catalytic effects on the Portuguese economy.

2.2.2. Data sources

The study utilised two **primary data sources**, complimented by a detailed literature review:

1. **Hard data provided by the Portuguese Space Agency**:
    - Financial data of the commercial entities active in the Space Sector for the years 2019, 2021, 2022, 2023 and 2024, including relevant CAE codes

- Detailed hard data of government spending in the space sector and space programmes since 2014
- Detailed budgeting for international space programs, contributing to institutions including, among other, ESA, EU and ESO
- Investments from Venture Capital/ private capital investors in Portuguese space-related startups

2. **Additional data and information provided by other stakeholders:**
   - Ranking of perceived impact of catalytic effects through a questionnaire. The questionnaire was shared with a comprehensive list of actors (156+)
   - Selected interviews with 28 space sector representatives to verify key qualitative assumptions, collect case studies, and assess current perceptions of the Portuguese Space Ecosystem by those active in it
   - Interviews with ESA economic experts to validate methodological approach and specific econometric assumptions

Relevant KPIs including source of revenue, patents filed, R&D conducted etc.

The study complemented primary data sources with **secondary sources** of information to provide contextual data and fill potential data gaps:

1. Novaspace **Market Intelligence databases** include over 3 million data points across 18+ reports, which were leveraged to complement data and provide benchmarks
   - Government Space Programs – database and analysis of all institutional spending for space activities worldwide
   - Space Economy Report – database and analysis of all commercial revenues linked with space activities worldwide
   - Satellites to be Built and Launched – database and analysis of all satellites worldwide, including value of launch and manufacturing

2. **Reports, sector analysis and literature review**
   - Catálogo Espacial Português – an in-depth listing of the key players in the national Portuguese ecosystem created by the Portuguese Space Agency
   - Portuguese Space Catalogue – a detailed overview of the Portuguese space community and their competencies created by the FCT
   - Academic literature – by key authors on the space sector in Portugal and beyond

3. **Statistical indicators**
   - Classificação Portuguesa de Atividades Económicas Rev 3
   - International Standard Industrial Classification of All Economic Activities, Revision 4 (ISIC Rev. 4)
   - IMPLAN methodological articles and data
   - OECD Handbook on Measuring the Space Economy
   - World Bank annual exchange rates

2.3. Defining the space industry

Having defined the total inputs to the model for goods and services generated by the national space industry, the study team **allocated this spending across standardised industry classifications compatible with whole-economy models of Portugal**. This enabled the accurate capturing of the total economic impact of the national space sector.

Currently, international industrial classification systems do **not recognise the space sector as a distinct industry**. Instead, space-related activities are dispersed across various sectors.

In the model, all industrial revenues are attributed to companies that classify themselves within standard industrial frameworks. For each company whose revenue was included, its primary classification under the **Portuguese Classification of Economic Activities (CAE) was referenced, aligned with the third revision of CAE**. These CAE codes can be matched to the European statistical classification of economic activities (NACE) classification system, which in turn can be translated into the United Nations' International Standard Industrial Classification of All Economic Activities, Revision 4 (ISIC Rev. 4). The model is built using Input/Output tables derived from OECD data, **covering 46 disaggregated industries. These industries are mutually exclusive and collectively account for the entire national economy, subject to some model-specific adjustments.** Since OECD industry data maps directly to ISIC Rev. 4, and therefore also to NACE and CAE codes, it is possible to allocate model inputs to the appropriate industry based on stakeholder-reported revenue in Portugal. When stakeholders report multiple CAE codes, up to five in addition to a primary one, **revenue can be allocated proportionally**, with the majority assigned to the primary classification and the remainder distributed among the others.

Exhibit 3: Framework distribution of revenue among primary and secondary CAE codes

	1	2	3	4	5	6
Only primary CAE	100%	-	-	-	-	-
1 secondary CAE	80%	20%	-	-	-	-
2 secondary CAE	80%	10%	10%	-	-	-
3 secondary CAE	80%	7%	7%	6%	-	-
4 secondary CAE	80%	5%	5%	5%	5%	-
5 secondary CAE	75%	5%	5%	5%	5%	5%

For **government spending not directly tied to industrial goods and services but linked with university programmes**, the study lacked direct revenue data but can estimate industrial impact using the CAE classifications provided for universities active in space-related activities. This allows to approximate the distribution spending across relevant sectors.

Whenever additional activities **cannot be traced to specific universities** (e.g., the government producing own space services), inputs were mapped to relevant industrial classifications according to guidelines of the "Handbook on Measuring the Space Economy," published by the OECD, which provides some indications to map space activities on industrial statistical classifications.

Exhibit 4: Matching space activities with International Standard Industrial Classification (ISIC) codes (source: OECD Handbook)

Space Activity	ISIC	ISIC description
Fundamental and applied research	72	Scientific research and development
Research and development services, engineering services (testing, design)	71	Architectural and engineering activities; technical testing and analysis
Space systems manufacturing (satellites and launchers)	20	Manufacture of chemicals and chemical products
	22	Manufacture of rubber and plastics products
	25	Manufacture of fabricated metal products, except machinery and equipment
	26	Manufacture of computer, electronic and optical products
	27	Manufacture of electrical equipment
	28	Manufacture of machinery and equipment n.e.c.
	30	Manufacture of other transport equipment
Construction of space facilities (e.g. spaceports and other ground facilities, observatories)	42	Civil engineering
Space Launch Activities	51	Air transport
Operations of Space Systems	61	Telecommunications
Satellite users' terminals and devices (GNSS chipsets, satcom terminals etc)	26	Manufacture of computer, electronic and optical products
Satcom services	60	Programming and broadcasting activities
	61	Telecommunications
EO and Satnav services	63	Information service activities

In total, the study **identified 124 unique CAE codes** relevant to stakeholders active in the Portuguese space sector, which were mapped to the closest of the 46 OECD-defined industries. Revenue could be traced to 30 of these industries, with the highest shares allocated to **Telecommunications, Professional, Scientific and Technical Activities, and Other Service Activities**.

Since CAE codes are self-reported by companies that may be active across different sectors, some **bias can be introduced into the model**. In particular, certain industrial classifications self-reported by companies active in multiple sectors may be less relevant to specific space activities. As it is not possible to obtain data that precisely matches each space activity and link it to the closest industrial classification, the model was based on self-reported CAE codes. However, the resulting distribution was reviewed with the Portuguese Space Agency and the necessary adjustments were made to ensure that the industries represented are the most relevant to national space activities.

In addition to adjustments to CAE codes, **the following additional adjustments were applied**, to the values of commercial revenues and institutional funding:

- The hard data covers the years 2019, 2021, 2022, 2023, and 2024, with a gap **in 2020 due to changes in the agency's data tracking practices**. The 2020 values were estimated by running a regression between government investments in space (available for the full period) and reported revenues (available for all years except 2020). The estimated coefficient from this regression was applied to derive fitted values for 2020.

Industrial Revenues

- The dataset captures detailed revenues from major prime contractors in the national space sector. However, **revenues from some subcontractors may be missing**. Since the objective is to model Gross Value Added, all relevant revenues must be included. Following discussions with the Portuguese Space Agency, industrial revenues were increased accordingly to account for this discrepancy.
- Revenues from **law firms,** with space-specialised practices, were not included in the original data. Their revenues were estimated based on the number of personnel engaged in space-related programs.

Institutional Funding

- **ESA funding allocated to national institutions** was added (which was underestimated in the data of funding to national institutions) derived from Portugal's total contribution to ESA during the period.
- **Additional research funding to selected institutions was allocated** based on the Portuguese Space Agency's feedback.
    - DGT received €27,730,000 from a PRR project related to geospatial technologies, including very high-resolution imagery – 30% of this budget was estimated to be related to civil space projects and therefore added as inputs to the model
- The **missing funding from Defence** (Air Force, Army, Navy), and other entities engaged in operational or downstream space-related activities (e.g., IFAP, APA) was accounted for.
    - Defence (Navy, Army, Air Force) received €2,974,743 between 2019–2024 from ESA, HE/H2020, PT2020/PT2030, or PRR. Defence most likely complemented these projects with own funds.
    - Defence spending was included under idD (the public entity responsible for defence-related investments)

Exhibit 5: 46 Unaggregated industries used in the model

Code[1]	Industry description
1	Agriculture, hunting, forestry
2	Fishing and aquaculture
3	Mining and quarrying, energy producing products
4	Mining and quarrying, non-energy producing products

[1] Codes as reported in IMPLAN, the economic model provider for this study, based on OECD data.

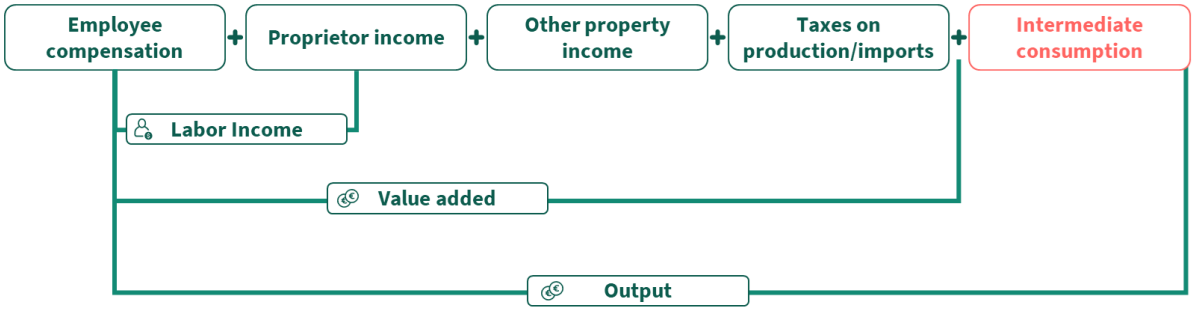
Code[1]	Industry description
5	Mining support service activities
6	Food products, beverages and tobacco
7	Textiles, textile products, leather and footwear
8	Wood and products of wood and cork
9	Paper products and printing
10	Coke and refined petroleum products
11	Chemical and chemical products
12	Pharmaceuticals, medicinal chemical and botanical products
13	Rubber and plastics products
14	Other non-metallic mineral products
15	Basic metals
16	Fabricated metal products
17	Computer, electronic and optical equipment
18	Electrical equipment
19	Machinery and equipment, nec
20	Motor vehicles, trailers and semi-trailers
21	Other transport equipment
22	Manufacturing nec; repair and installation of machinery and equipment
23	Electricity, gas, steam and air conditioning supply
24	Water supply; sewerage, waste management and remediation activities
25	Construction
26	Wholesale and retail trade; repair of motor vehicles
27	Land transport and transport via pipelines
28	Water transport
29	Air transport
30	Warehousing and support activities for transportation
31	Postal and courier activities
32	Accommodation and food service activities
33	Publishing, audiovisual and broadcasting activities
34	Telecommunications
35	IT and other information services
36	Financial and insurance activities
37	Real estate activities
38	Professional, scientific and technical activities
39	Administrative and support services
40	Public administration and defence; compulsory social security
41	Education
42	Human health and social work activities
43	Arts, entertainment and recreation
44	Other service activities
45	Activities of households as employers; undifferentiated goods- & services-producing activities of households for own use
46	Taxes on products net of subsidies

2.4. Economic analysis

2.4.1. Contributions to the Portuguese economy: Output

Having inserted the inputs to the model, the I/O model provides output as its primary outcome. Output corresponds to the **total monetary value of production**. The total value of production of an industry can be captured by the industry's total sales. In other words, output equals the **monetary value of economic activities in the nation**, or, more precisely, the overall value of labour income, other property income, taxes on production, and intermediate consumption.

Exhibit 6: Elements of output (Source: Implan)



Economic activities linked with output can be:

- **Direct,** referring to the economic activity attributable to entities active in the national space industry. This includes wages, profits, taxes and intermediate consumption directly linked with the space industry.
- **Indirect (supply chain),** referring to economic activity attributable to businesses and workers along the supply chain of the national space industry.
- **Induced,** referring to wider economic effects attributable to household expenditures derived from wages paid to direct and indirect employees. In other terms, the portion of space-industry derived wages which was spent by employees across the national economy.

The value of **Direct Output** is equal to the total value of the **inputs to the model**.

2.4.2. Contributions to the Portuguese economy: GVA

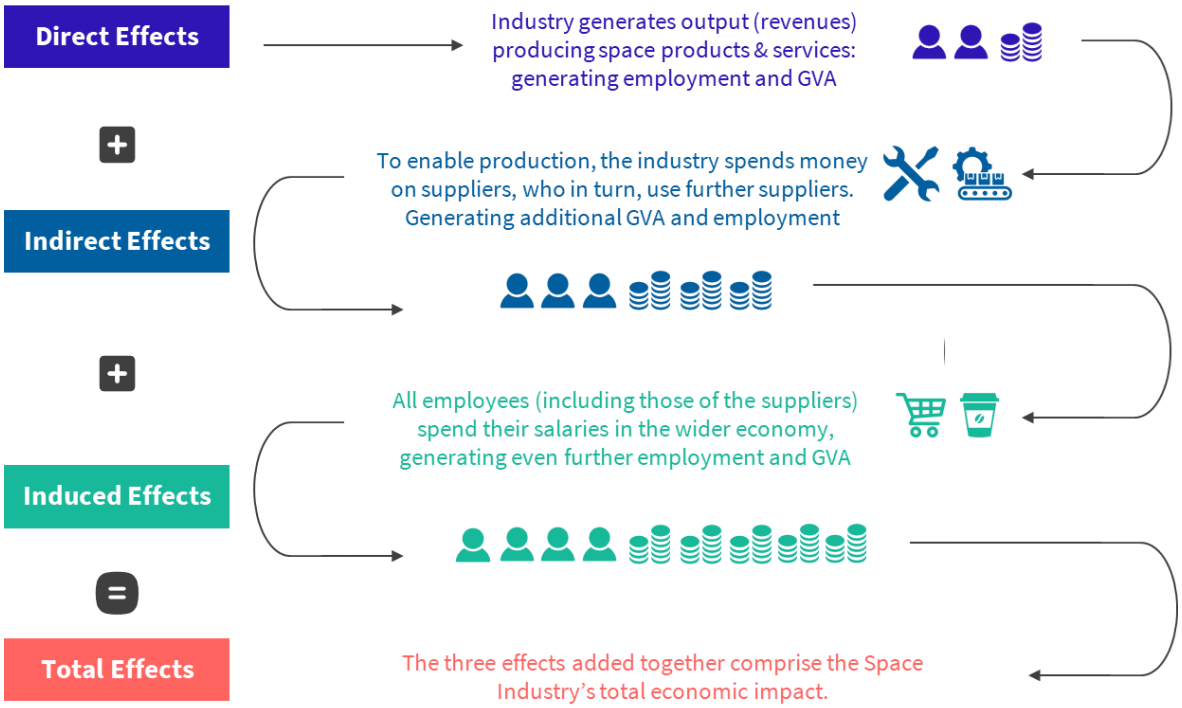
While GDP represents the total value of all final goods and services produced in a nation, **an individual industry's output is not equivalent to its contribution to GDP**. This is because industry output includes the value of **all production stages**, including intermediate goods like raw materials, components, utilities, etc. This is represented by intermediate consumption; inter-company transactions, such as when both a prime and its subcontractor record revenue from the same demand, as well as other expenditures to suppliers or fixed costs (e.g., raw materials, components, utilities, business services, IT services & software license, rents, imported goods and services, etc.). These intermediate transactions are not new value added but rather transfers between industries. Including them in GDP calculations would result in double counting.

To avoid this, the study calculates **Gross Value Added (GVA), which measures the value created by the space sector after subtracting intermediate consumption from output**. GVA includes employee compensation, income to business owners, property income, and taxes on production. As such, **total GVA is the space industry's contribution to Portugal's GDP,** and is the primary target result of this study. In similar fashion to output, total GVA is also made up of Direct, Indirect, and Induced GVA, referring to the Gross Value Added generated directly by the space industry (Direct), that generated by its supply chain (Indirect), and that generated in the wider economy (Induced), see Exhibit 7 below.

Beside Output and GVA, two other figures were calculated to provide a comprehensive view of the impact of inputs on the national economy:

- **Government tax revenues**, including income taxation on wages, corporate taxation and indirect taxation (such as sales, excise and property taxes). Taxation is extrapolated to provide a better understanding of financial returns to government's investments
- **Employment**, measured as the number of jobs in headcount per year including full time, part time and seasonal employment. Employment is a function of average industry wages, which allows for the estimation of the number of jobs per year

Exhibit 7: Conceptual representation of economic effects supported by the space industry (Source: ESA CM22 Economic Impact Report & Novaspace analysis)



2.4.3. Contributions to the Portuguese economy: Multipliers

Another critical result of an I/O model is multipliers. Multipliers help understand how the space industry impacts the broader economy, and furthermore, provide the relationship between direct, indirect and induced effects.

- **Type I multipliers** represent indirect effects. This type considers only the purchases made by space actors within their supply chain. It is calculated as:

$$\frac{Direct\ effects + Indirect\ effects}{Direct\ effects}$$

- **Type II multipliers** (or SAM[2] multipliers) represent indirect and induced effects, including the impact of household spending. This is the more commonly used multiplier. It is calculated as:

$$\frac{Direct\ effects + Indirect\ effects + Induced\ effects}{Direct\ effects}$$

2.5. Catalytic impacts

2.5.1. The further reaching impacts of the industry

An input-output model captures only the economic activities immediately involved in the production of final goods and services. **It excludes broader impacts that do not directly affect measurable market transactions.**

However, space activities have **far-reaching effects that enhance efficiency and innovation across the wider economy**. These broader benefits, referred to as catalytic effects, have been grouped into three main categories:

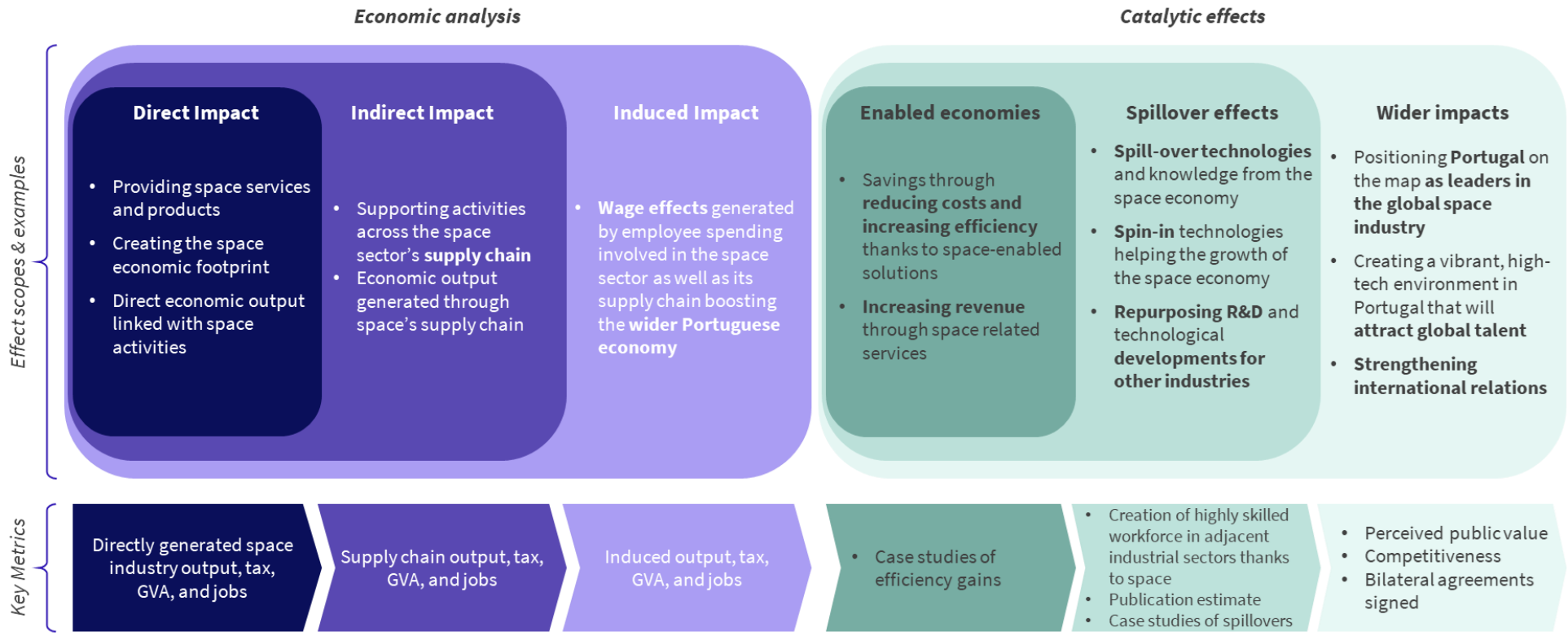
- **Enabling effects**: space technologies provide capabilities unavailable from the ground, such as precision navigation or Earth observation. These improve efficiency in sectors like agriculture, logistics, and navigation-based services.
- **Spillover effects**: investments in space drive technological advancements, foster research and development, and lead to the commercialisation of new technologies. These innovations often spread to other industries, enhancing productivity in sectors like automotive or telecommunications.
- **Wider societal impacts**: space activities support scientific research, strengthen national sovereignty, inspire future generations, and elevate a country's international standing. For example, they can help attract global talent and foster international collaboration.

[2] Social accounting Matrix (SAMs) expand upon the traditional I-O tables to also include transactions between Industries and Institutions and between Institutions themselves, thereby capturing all monetary market transactions in a given time. IMPLAN can thus more accurately be described as a Social Account Matrix (SAM) model, the terms I-O and SAM are used interchangeably.

Despite their importance, these catalytic effects are difficult to capture in standard economic models, for three main reasons:

- **Indirect efficiency gains**: consider a space company selling geolocation services. The revenue from those services is captured in the model. However, the increased efficiency they enable, such as a food delivery company optimising its logistics, is not. That added value is attributed to the delivery company and its industry, not the space sector. Moreover, it is difficult to determine how much of that efficiency is truly due to space-based services or could be gained through alternatives (e.g., ground-based systems)
- **Spillover technologies**: the model is ex-post; it measures economic activity after it has occurred. If a spin-off technology from the space sector boosts productivity in another industry (e.g., new materials in automotive manufacturing), the resulting growth is captured in that industry's value added, not in the space sector's output. Including it under both would lead to double counting
- **Non-market societal impacts**: broader effects like national prestige, inspiration, or strengthened diplomatic ties do not have a market price and do not directly affect measured demand. While these can indirectly lead to outcomes like increased trade or innovation, isolating their economic value within an input-output model could provide misleading figures of value added to the economy

Exhibit 8: All impacts included in the study, from the economic analysis to catalytic effects



2.5.2. Impact scoring

As such, while all the economic activities with a clear link to the space industry are included in the model, **other economic activities used by the space sector are either included in other industries' value added or lie beyond what traditional economic models can quantify**. Yet these effects are useful to qualitatively add to the analysis to provide a more complete picture of the total benefits of space activities.

A comprehensive list of catalytic impact drivers was developed, which was subsequently validated with the Portuguese Space Agency. The **full list of catalytic impacts and the method for the collection of their data** can be found in Annex A.

Having identified a comprehensive list of relevant catalytic effects, the study developed three tools to incorporate these effects into the study, providing both context and a better understanding of the broader impacts of space activities.

1. **Qualitative scoring based on stakeholder insights**: each catalytic effect is assessed using a qualitative scale (from low to high impact – e.g., 0 to 3), based on interviews with companies and other stakeholders active in the Portuguese space sector. This allows for the evaluation of how individual stakeholders perceive their space-related activities to have contributed to each catalytic impact. Scores are be gathered through a stakeholder survey and shared with a comprehensive list of all actors active in the space sector nationally.

   For instance, regarding technological spillovers (Question E3 in the survey), the survey asks to rate from 0 to 3 how developed space-related technologies have been transferred to non-space industries.

   Responses are consolidated across all stakeholders to highlight the most significant catalytic effects during the study period. More detailed interviews with the most relevant stakeholders were also conducted to extract additional insights and contextualise the survey's scorings.

2. **Case study development**: notable examples emerging from the interview campaign were selected for in-depth case studies, illustrating specific catalytic impacts. For example, a case might detail how the use of space services has allowed for efficiency gains or cost-saving in a non-space sector or activity.

3. **Quantitative KPIs and supporting data**: where possible, relevant key performance indicators were collected to provide a more quantitative view of specific catalytic effects. These include data such as the number of space-related patents filed, scientific publications linked to space activities, etc.

2.6. Stakeholder engagement

As has been referenced previously, **stakeholders were engaged** to provide data regarding the catalytic impacts in two ways, **via a survey, and via interviews** of selected key actors. The interviews also served to gather additional insights on case studies and contextual aspects. This method ensured a wide range of players was reached while acquiring targeted and in-depth information and case studies to properly assess some of the more complex catalytic impacts.

Exhibit 9: Survey and interview structure

	Surveys	Interviews
Objective	Provide a numerical analysis of qualitative impacts	Identify case studies and qualitative insights
Target subjects	**All stakeholders** (around 160 identified companies)	**Key players** in the Portuguese Space Ecosystem **(+/- 32)**
Length	Around 40 questions (depending on the type of entity)	Approx. 1 hour
Format	EU survey shared via email* (GDPR compliant)	Mostly online meetings (with invite via email)
Topics/content	Focus on catalytic impacts	Semi-structured discussion to gather deeper insights into the Portuguese space industry for the SEA
Output objectives	**Overview of impacts' relevance to stakeholders**	**Case studies and qualitative insights**

2.6.1. The survey

As shown above, **a pre-approved survey by the Portuguese Space Agency was hosted on EU Survey tool to ensure full GDPR compliance and allow for simple data extraction**. The link to it was shared via email with all the identified stakeholders in the Portuguese space ecosystem from a combination of information provided by the Portuguese space agency and independent research.

The survey comprised of approximately **40 questions split into various categories**:

- Introductory information on the respondent
- Key economic data about the respondent and their activities
- Strategic information about the respondent and their activities
- Technical and scientific information about the respondent and their entity
- Societal impact and engagement information
- Legislative issues and opinions; priorities for future development of the sector

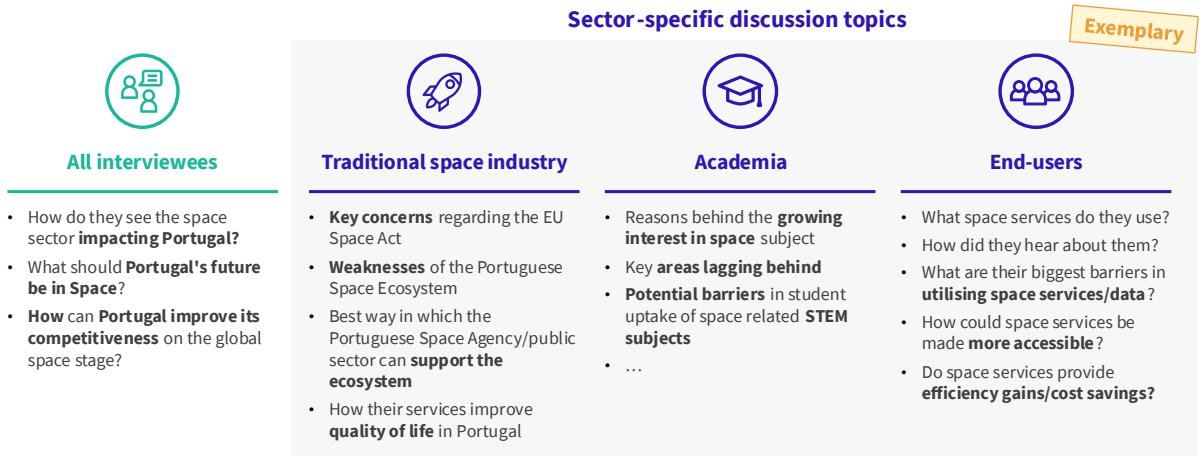
Within these sub-groups, some questions only display for certain respondent types, such as academia. Through these, data on the majority of the catalytic impacts was collected, as detailed in Annex B. Moreover, to **ensure the widest uptake possible** it was shared with the option to answer it in either Portuguese or English, while still pooling all the data in one database.

2.6.2. The interviews

The interviews were carried out in a **more targeted fashion via the selection of 32 key players from across the ecosystem**, taking care to include actors from across the value chain, academia, and end users. The sessions were conducted through a mix of online and hybrid interviews. **The final list of selected interviewees was also validated by the Portuguese Space Agency** before the process was initiated.

Once approved, these were contact via email with a preview of the topics to be discussed and were then be requested to book a **one-hour online interview slot**. The selected topics varied depending on the type of stakeholder (e.g. end users vs traditional space industry) and were discussed in a semi-structured format to allow for the gathering of information on potential case studies, as well as broader qualitative insights**.** More specifically, the interviews were split into general questions for all participants and then specific subsets for state entities, academia, and classic industry players.

Exhibit 10: Interview discussion topics



2.7. Benchmarking methodology

The benchmarking is a vital part of the study. By **comparing Portugal's position and performance in the space sector against comparable countries**, both within and outside of Europe, with similar technological and strategic profiles the study extracted best practices and lessons learned to develop proposals for the future of the Portuguese space sector.

2.7.1. Selection of benchmarking countries

To ensure a wide range of possible relevant comparisons, as well as increase the potential for the extraction of impactful best practices, three types of countries were identified as targets for benchmarking, with the validation of the Portuguese Space Agency:

- **Similar countries: The Czech Republic and Greece**
  Similar development stages within the space sector, as well as having an approximately equal budget
- **Mid-tier space countries: Spain and Sweden**

Somewhat larger budgets and a more developed space economy, these are expected to serve as key providers of best practices for Portugal's next steps

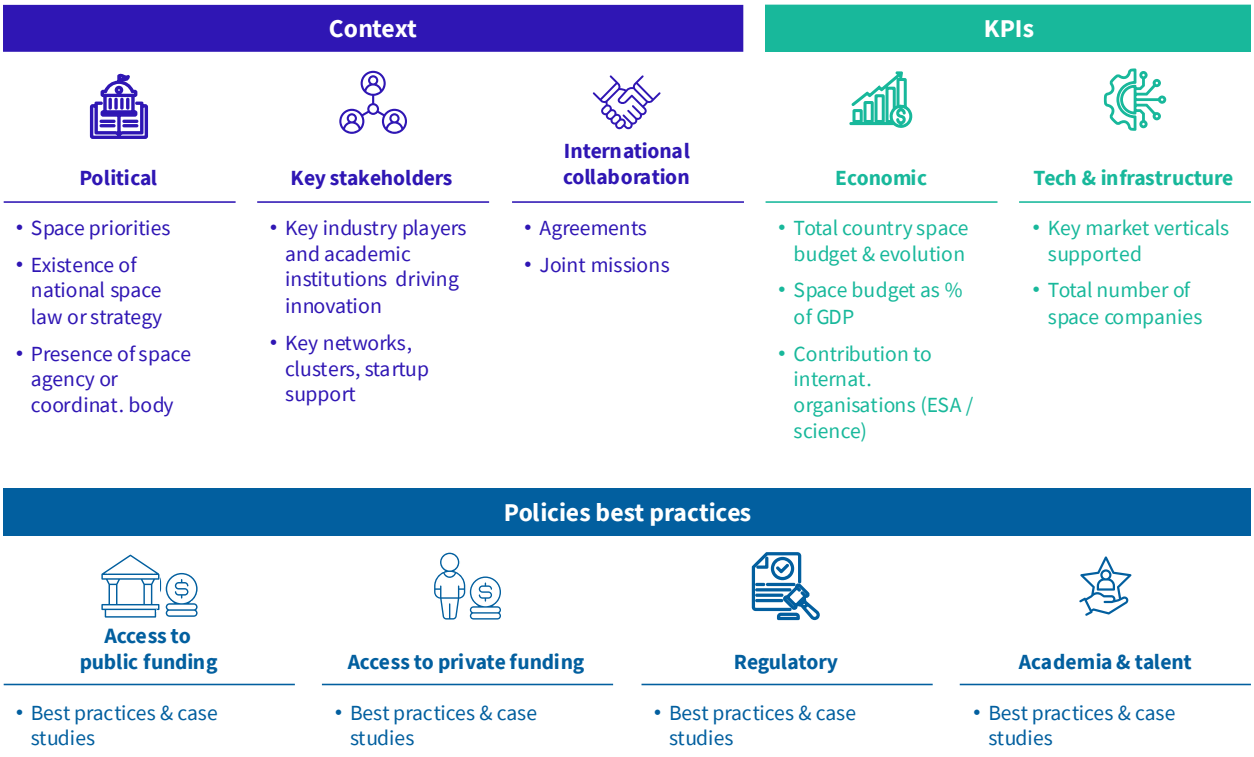
- **Non-European country: New Zealand**
  More global perspective while retaining a relatively similar profile to Portugal, including for instance their focus on developing a national access to space ecosystem

Taken together, these five countries provide key benchmarking insights to assess both Portugal's current position, and its potential for future development.

2.7.2. Benchmarking structure and data collection

The benchmarking was designed to provide Portugal with critical insights, and was therefore structured around three components: countries' contextual information, KPIs, and best practices.

Exhibit 11: Benchmarking structure



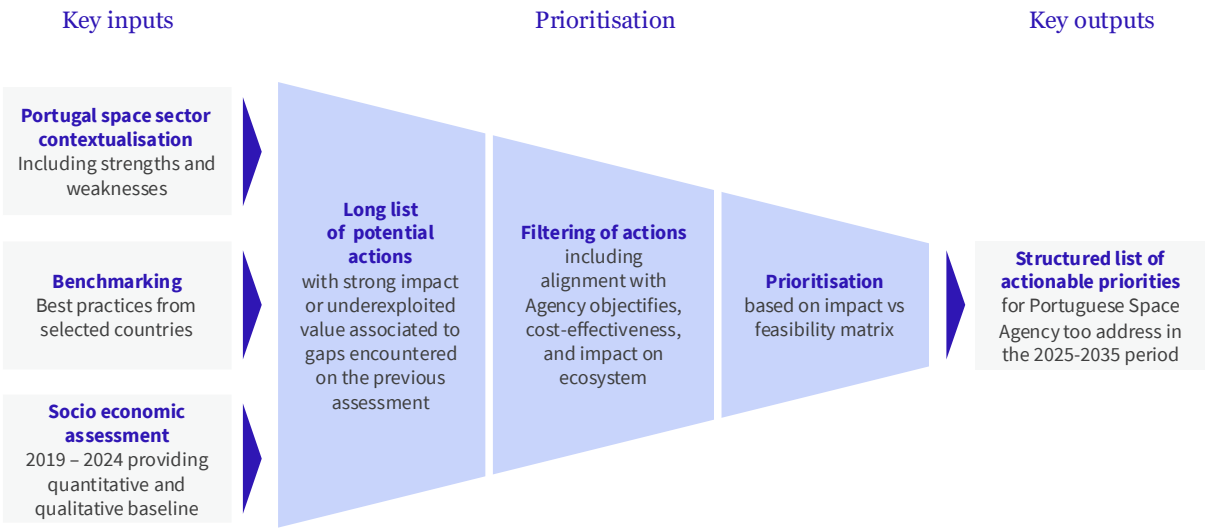
To conduct the benchmarking, data was gathered, as outlined in section 2.2.2, through a combination of existing **Novaspace Market Intelligence reports, third party reports, sector analysis and literature review, and statistical indicators**. By combining this data with information collected through the survey, interviews, and Portuguese Space Agency-provided sources, the analysis developed a clear and reliable picture of the space sector in the five benchmarked countries and in Portugal, **highlighting national strengths, challenges, and potential solutions**.

2.8. Strategic priorities definition methodology

The definition of strategic priorities takes as input the **insights from the Portuguese space sector evaluation, benchmarking and socioeconomic impact assessment analysis**, creating a long list of potential ideas. All potential actions are analysed through a set of filters ensuring that the final

recommendations are pragmatic, forward-looking, and aligned with the strategic objectives of Portugal and the broader EU space policy. The exhibit below showcases the different steps envisioned to ensure alignment and prioritisation.

Exhibit 12: Methodology for actionable priorities definition



The long list of actions have been filtered in particular considering alignment with the Agency's objectives, cost-effectiveness of actions and impact. Additionally, further strategic points were considered, e.g.:

- Alignment with European priorities including ESA and EU space initiatives
- Alignment with overarching space market trends
- Economic potential, e.g., potential impact on market growth and competitiveness
- Existing scientific and technological strengths
- Societal and environmental relevance
- Feasibility, including resources required, maturity of the ecosystem & regulatory readiness
- Potential trade-offs

The shortlist of strategic priorities were discussed and validated with the Portuguese Space Agency to ensure relevance and alignment

3. The Portuguese space sector at a glance

3.1. Context

Portugal's engagement with space dates back to the 1960s, when the Portuguese company Amorim Cork provided cork to be used as thermal protection for the Saturn V rocket. This early contribution was followed by Portugal's accession to **EUMETSAT in 1989** and the launch of **PoSAT-1 in 1993**, the country's first satellite, developed through a partnership between Portuguese universities, industry, and Surrey Satellite Technology.

Before joining ESA, Portugal signed a **bilateral agreement in 1996** that allowed national entities to participate in navigation-related activities. Later, Portugal became a founding member in **Galileo & EGNOS in 2004,** anchoring its role in navigation, with companies as GMV Portugal, Critical Software, and Deimos contributing to mission control, safety-critical software, and system validation.

Similarly, Portugal joined the **European Southern Observatory (ESO) in 2001**, after being already in **agreements with ESO since 1990.** These agreements granted Portuguese astronomers access to ESO facilities, while government strengthened national astronomy capabilities and research infrastructure. In particular, this collaboration was essential for the establishment of the strong astronomy sector that Portugal benefits from today.

A significant milestone that **solidified Portugal's growing role in space domain was its accession to ESA in 2000**. This allowed national organisations to access ESA's mandatory programmes and strengthened the participation in optional areas in which Portugal was already engaging, such as navigation and telecommunications. Early activities were centred on the **ESA Science Programme, with contributions to missions** as Gaia, Cheops, and Solar Orbiter. The Instituto de Astrofísica e Ciências do Espaço and Instituto Superior Técnico were among the first to provide scientific expertise, instrumentation and data analysis capacities to such missions.

In particular for telecommunications, the participation through **ESA ARTES** opened industrial opportunities, enabled technology development and competitiveness, with key stakeholders as Lusospace, Omnidea, Critical Software, Tekever, GMV, Deimos & EDISOFT involved. The Santa Maria ground station in the **Azores joined ESA's Estrack network in 2008**, providing launcher tracking.

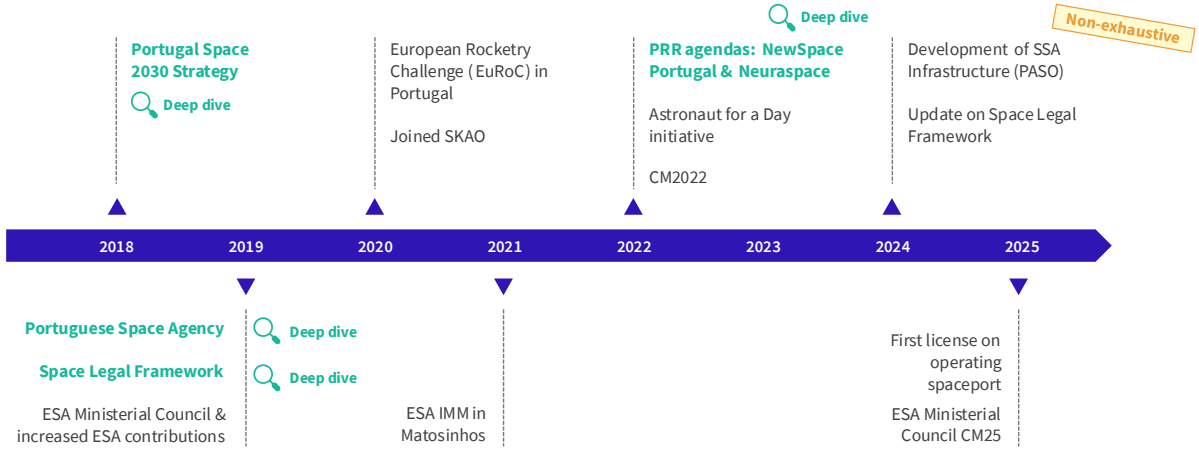
By the late 2000s, Portuguese entities were engaged across the space value chain, from upstream technology development to downstream service applications. These efforts laid the foundations for the country's industrial competitiveness and helped define the key technological domains that would later reinforce Portugal's national space strategy.

Entrepreneurship and innovation have been actively promoted to capture emerging opportunities. The **ESA Business Incubation Centre (ESA BIC) Portugal established in 2014** at Instituto Pedro Nunes in Coimbra successfully fostered technology transfer and supported start-ups developing space-related solutions. The network has since expanded, including incubators in Lisboa, Aveiro, Porto, Braga, Matosinhos, Azores and Madeira. In 2022, ESA BIC Portugal–incubated companies

Delox, Fibersail, Neuraspace, Spotlite, and Stratio raised a combined €25 million in investment[3], highlighting the growing space entrepreneurship ecosystem. ESA Technology Transfer Brokers and ESA Business Applications Ambassadors further support downstream business in Portugal.

Since 2018, Portugal has achieved **a series of key milestones that have shaped the trajectory of its space sector**, including the adoption of the Portugal Space 2030 Strategy, the creation of the Portuguese Space Agency, the approval of a dedicated space legal framework, and the launch of national initiatives as the PRR agendas. These developments have been complemented by investments in infrastructure, education, and international partnerships, marking a period of significant consolidation and growth in the industry. In the next subchapters the key milestones in this period, which shaped the recent sector's evolution are examined in detail.

Exhibit 13: Key milestones in the Portuguese Space sector from 2018 to 2025



In particular, the adoption of the Portugal Space 2030 Strategy in 2018 was a significant milestone, as it aligned national priorities more closely with ESA's roadmap and prepared for greater participation. At the **ESA Ministerial Council "Space19+" in 2019, Portugal made its largest financial commitment to date**, increasing its contribution to €102 million. This commitment was further strengthened at the CM22, where Portugal increased its subscription even further to €115 million. This enabled stronger involvement in ESA's programmes.

Portugal's participation in ESA's JUICE (scientific mission launched in 2023 to Jupiter Icy Moons) and Hera (launched in 2024 as a planetary defence mission to an asteroid) missions was **facilitated through its long-term commitment to ESA**. Portuguese entities as Deimos Engenharia, Instituto Superior Técnico, the Instituto de Astrofísica e Ciências do Espaço, Tekever, FHP e GMV contributed to these missions, and demonstrated Portugal's capacity to deliver advanced technologies for major space exploration programmes.

In the first quarter of 2025, Portuguese companies such as Lusospace and FHP secured €8.7 million in ESA contracts, marking the largest single-mission ESA contract volume ever awarded to Portugal. These achievements confirm the **economic return of Portugal's investments in ESA programmes**

[3] https://commercialisation.esa.int/2023/07/esa-bic-portugal-start-ups-raised-e-25-mln-in-2022/

and highlight the growing competitiveness, technological maturity, and credibility of the national space industry within the European ecosystem.

Additionally, In July 2025, ESA has chosen the Portuguese Gulbenkian Institute of Molecular Medicine (GIMM), in Lisbon, to host its new biobank. **GIMM will become the only European site to store biological samples from ESA space missions**, astronaut analogue studies, and microgravity research. For Portugal, this decision not only reinforces Portugal's growing credibility in space and life sciences but also creates new opportunities for collaborations and drives growth of related fields like aerospace medicine, biotechnology, and translational clinical research.

Looking ahead, Portugal is preparing for the ESA Council at Ministerial Level in Bremen in 2025 (CM25), a decisive meeting that will set ESA's priorities and budgets for the coming years. For Portugal, CM25 is of strategic importance, as it offers a **unique opportunity to influence the European agenda, align future investments with national priorities, and secure opportunities** for Portuguese industry, research centres, and start-ups to take part in ESA programmes.

At CM25, ESA will put forward **priorities shaped by its long-term Strategy 2040**, which sets out Europe's ambitions in space across five overarching goals: Protect our Planet and Climate, Explore and Discover, Strengthen European Autonomy and Resilience, Boost Growth and Competitiveness, and Inspire Europe. These goals are supported by concrete objectives such as advancing a zero-debris space economy, enhancing Earth Observation for climate action, ensuring secure and independent access to space, and accelerating industrial innovation.

Additionally, **ESA's Agenda 2025 serves as a short-term strategic roadmap** guiding the agency's priorities over four years, starting at the intermediate ministerial meeting in 2021. Key priorities include boost commercialisation for a green and digital Europe, strengthen space for safety and security, and address programme challenges (e.g., maintain EU access to space). In particular, the agenda promotes the development of flagship missions in climate monitoring and secure connectivity, while encouraging greater participation from emerging space nations.

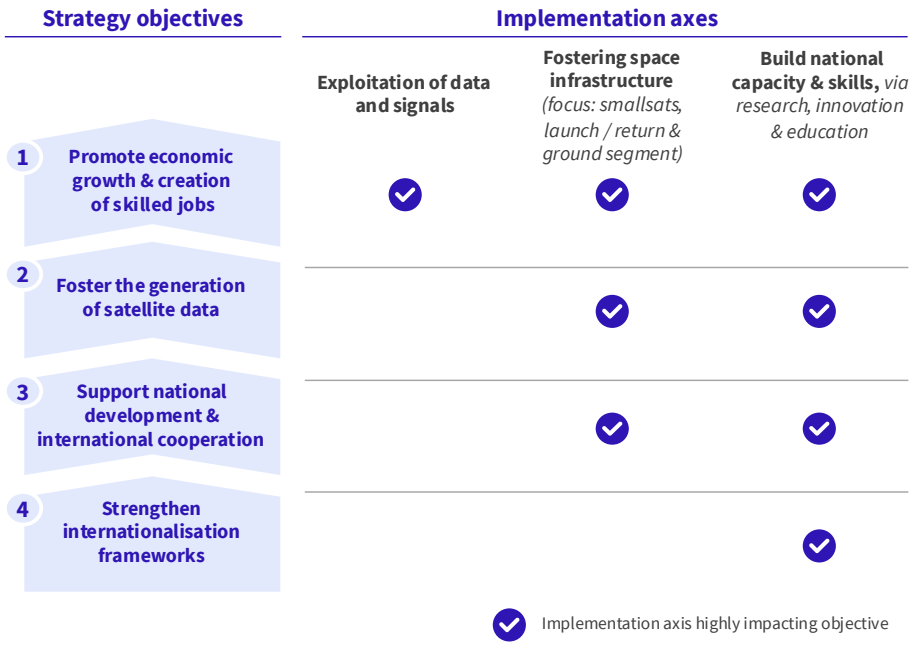
Portugal's **national priorities are well aligned with ESA's strategic direction**. For example, investments in SSA/SST (e.g., through Neuraspace, PASO, and others), in EO applications (with expertise in oceans, forestry, and climate monitoring), and in strategic infrastructure (such as the Santa Maria teleport, Santa Maria Technological Center and the Malbusca Launch Centre) all contribute directly to ESA's vision of resilience, innovation, and autonomy. Furthermore, the objective to Inspire Europe by cultivating a vibrant space ecosystem and fostering collaboration among stakeholders presents an important opportunity for Portugal to deepen partnerships and reinforce Europe's collective position in the global space sector.

3.1.1. Portugal Space 2030 Strategy

The Portugal Space 2030 Strategy, approved by the Council of Ministers (Resolution No. 30/2018), sets **ambitious targets for the development of the national space sector**. Building on Portugal's Atlantic identity and maritime heritage, it positions the country to become a recognised authority in the science and economics of space-Earth-climate-oceans interactions. The strategy frames space as both a common good & a critical enabler of modern life, highlighting services as communication, weather forecasting, precision farming, banking, environmental monitoring, and scientific research.

The strategy foresees Portugal's integration into global space markets through innovation, public–private cooperation, and the **democratisation of space**. It seeks to maximise socioeconomic impact by fostering applications across sectors, while addressing global challenges such as climate change, environmental protection, and digital transformation. These ambitions are **structured around four strategic objectives and three implementation axes**, providing a clear framework for action.

Exhibit 14: Overarching view of Portuguese Space Strategy objectives and implementation axis



The **four objectives are mutually reinforcing**. The first is to stimulate economic growth and the creation of skilled employment, placing strong emphasis on the uptake of satellite data and signals to generate new markets and applications. The second complements this by focusing on the development of new space technologies and infrastructures, enabling Portugal to leverage international scientific and technological cooperation and position itself as a credible player in the global New Space economy.

The third objective is to support national development and strengthen international collaboration, capitalising on Portugal's unique geostrategic location in the Atlantic and promoting shared benefits of space activities with countries that have not yet developed their own capacities, with particular emphasis on Portuguese-speaking nations. Finally, the **fourth objective is a foundational enabler**, aiming to consolidate institutional, legal, financial, and educational frameworks that underpin the sector, thereby ensuring a solid foundation for sustained internationalisation and competitiveness.

The strengthening of internationalisation frameworks can also leverage Portugal's longstanding contributions to multilateral fora such as UNOOSA and UNCOPUOS – indeed, Portugal acted as the main stage for a number of recent key conferences. For instance, Portugal hosted the **Management and Sustainability of Outer Space Activities Conference in May 2024**, preceded by two

preparatory symposia. These efforts resulted in the adoption of the **Lisbon Declaration on Outer Space**, identifying six key points aimed at contributing to and ensuring a sustainable space future.[4]

To translate these objectives into action, the Strategy defined three implementation axes. The first axis is the exploitation of space data, which directly supports the goal of stimulating economic growth by driving downstream applications. The second axis focuses on the development of space infrastructures, including small satellites, ground stations, and the prospective launch & return infrastructure in the Azores, thereby contributing to objectives two and three while indirectly reinforcing the first. The third axis is capacity-building through research, education, and innovation, underpinning all four strategic objectives by strengthening national skills and technological capabilities.

Since its adoption, the Portugal Space 2030 Strategy has served as a **key reference point** for national and European initiatives, as explored in the following subchapters.

3.1.2. Portuguese Space Agency

The launch of the Portuguese Space Agency in March 2019 marked a milestone in the country's commitment to **consolidating its presence in the global space sector**. Created under the Portugal Space 2030 Strategy, the agency was established with the mandate to coordinate national activities in space, strengthen Portugal's participation in international programmes, and promote the development of a competitive industrial and scientific base. Its creation provided a clear institutional anchor for space policy, bringing coherence to initiatives that had previously been spread across multiple ministries and organisations.

In practice, the Agency oversees **Portugal's participation in key international organisations**, including ESA, the European Southern Observatory (ESO), and the Square Kilometre Array Observatory (SKAO), while providing strategic advice to the government on space-related matters. It also serves as the national liaison to the European Commission on programmes such as Copernicus, Galileo, IRIS^2, GOVSATCOM, SSA, and Horizon Europe, and represents Portugal on the Board of EUSPA.

From its inception, the Portuguese Space Agency has focused on **leveraging Portugal's geographic, academic, and industrial assets to foster innovation and attract investment**. A flagship initiative has been the New Space Atlantic Summit, organised by the Agency to bring together international stakeholders, industry leaders, and academic experts, highlighting Portugal's ambition to position itself as a hub for sustainable space activities and ocean science applications. The Agency has also successfully supported the increase in participation of Portuguese companies and research centres in ESA programmes, Copernicus, and Galileo, by facilitating access to European and national funding mechanisms and supporting industrial and scientific growth.

Beyond programme coordination, the Agency has played a key **role in raising awareness of the societal and economic value of space**. It has driven education and outreach initiatives, including the European Rocketry Challenge (EuRoC), the "Astronaut for a Day" competition, and the CubeSat Portugal Initiative, all designed to inspire students and promote STEM engagement. The Agency has

[4] Available at A/AC.105/2024/CRP.25/Rev.1.

also encouraged entrepreneurship through start-up support schemes (e.g., ESA BIC Portugal), helping to strengthen the national space ecosystem and ensure that space activities generate tangible benefits domestically and internationally.

Acting as a single point of contact for stakeholders both domestically and internationally, Portuguese Space Agency has significantly **enhanced the country's visibility in the global space community**. The Agency facilitates access to international funding and collaborative opportunities, while showcasing Portuguese capabilities on a global stage. These efforts have been crucial in further establishing Portugal in the global space sector and in laying the foundation for long-term ecosystem growth.

> *The Portuguese Space Agency is doing a great work on three key areas:*
>
> - ***Building awareness*** *on the overarching public, e.g., via educational activities*
> - ***Informing the importance*** *of space activities within public entities (how space can serve the country)*
> - ***Representing Portugal's space sector*** *internationally, e.g., with other agencies*

3.1.3. PRR space-related agendas

The Plano de Recuperação e Resiliência (PRR), or Recovery and Resilience Plan, launched by the Portuguese government for the period 2021 to 2026, was designed to **support the country's recovery following the COVID-19 pandemic**. Funded primarily through the EU's NextGeneration EU programme, the PRR aims to modernise the economy, accelerate the green and digital transitions, and strengthen social and territorial cohesion.

Investments and reforms under the PRR are organised around three dimensions: resilience, climate transition, and digital transition. A key instrument to promote large-scale collaborative projects is the Agendas/Alianças Mobilizadoras (Mobilising Agendas). In particular, the Agendas/Alianças Mobilizadoras para Inovação Empresarial (Mobilising Agendas for Business Innovation) **explicitly include the aerospace sectors**, alongside other strategic areas as ICT, health, and transport.

Within the PRR, two agendas have been launched to **strengthen Portugal's space sector, in synergy with its space strategy**. New Space Portugal targets the development of capabilities in satellite technologies, while Neuraspace/AI Space Debris focuses on Space Traffic Management.

In September 2025, the reprogramming of the Mobilising Agendas under Portugal's PRR resulted in an additional funding, with the **aerospace and space sectors receiving the largest boost.** Their support nearly tripled, rising from €244 million to €613.3 million, largely driven by two flagship agendas: Aero.Next, which seeks to develop the first Portuguese aircraft and received an additional €90 million, and New Space Portugal, which was reinforced with €279 million to advance satellite and space capabilities.

> *A key challenge of the PRR is that its **requirements can be quite restrictive**, sometimes **creating administrative burdens**. Activities such as PRR in sectors as space **should incorporate more input from the sector** to ensure that the restrictions are fair, practical, and aligned with industry realities*

New Space Portugal

Led by GEOSAT, the New Space Portugal initiative is **a collaborative effort involving over 40 organisations**, including CEiiA, idD, Lusospace, Omnidea, GMV, FHP, OpenCosmos. The project aims to establish comprehensive national capabilities along the complete satellite value chain, including payload and satellite development, operations and downstream services. The agenda targets the development of satellites for future constellations such as the Atlantic Constellation, Open Constellation, AIS/VDES Constellation, and SAR Constellation.

The initiative is structured around **five vertical projects focusing on R&D, innovation, and industrial development**, and six transversal projects that include promotion, training, and service demonstrations. A notable component is the creation of the "Digital Planet" platform, designed to integrate data from multiple sources and provide value-added services.

With a total estimated investment of €457 million (€178 million initially, reinforced with €279 million through the PRR reprogramming), the initiative will expand national satellite capacity, strengthening maritime surveillance, wildfire prevention, and defence applications. The programme is also expected to significantly boost Portugal's role in the global space sector, fostering innovation, driving economic growth, and deepening international collaboration.

> *Although the New Space Portugal agenda is highly promising, some smaller companies with limited capabilities are unable to contribute due to insufficient technical or organisational maturity*

Neuraspace/AI Space Debris

The Neuraspace/AI Space Debris initiative addresses the growing challenges posed by the rising number of satellites and space debris in orbit, aiming to **enhance space operation safety and sustainability through advanced STM solutions**. The project is led by Neuraspace and brings together a consortium of partners, including GMV, Instituto Pedro Nunes, Universidade de Coimbra, Universidade Nova de Lisboa, and Instituto Superior Técnico. The project is set to conclude in 2025, with a total eligible investment of approximately €24 million.

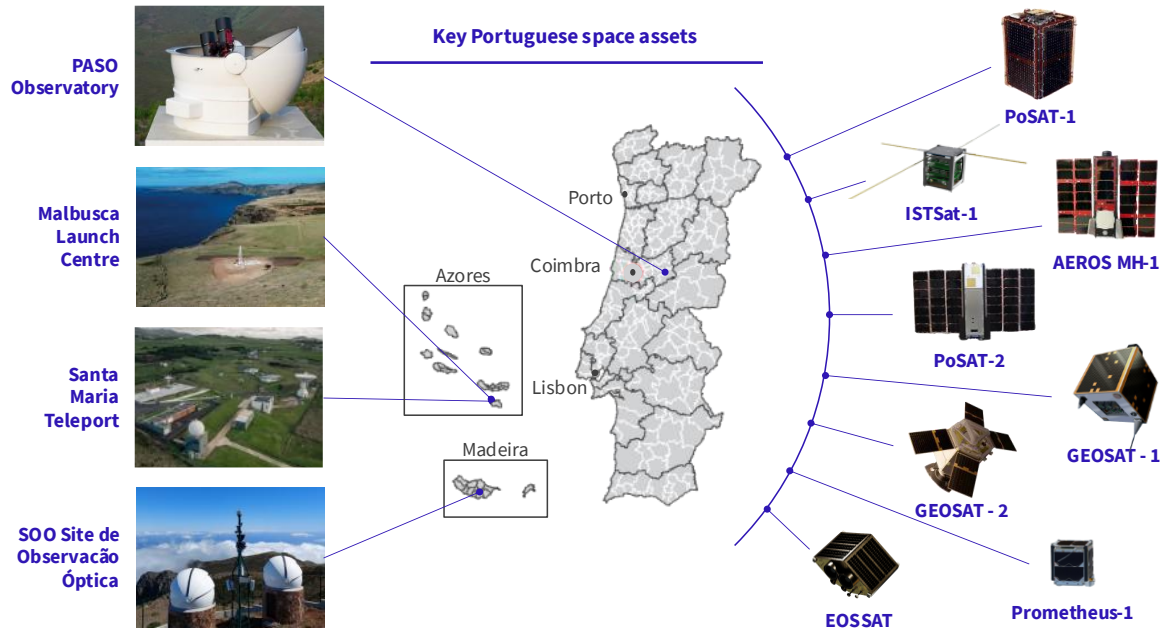
At the core of the project is the **development of a comprehensive STM platform** that leverages Artificial Intelligence and Machine Learning to enhance space traffic control and improve collision avoidance. The platform will provide automate risk assessment, predict potential collisions, and support safe and sustainable satellite operations.

The project is organised into five work packages focused on developing both tools and expertise. It actively **involves stakeholders across the space value chain**, including satellite operators, insurance providers, software developers, and regulators, ensuring that the solutions meet practical industry needs. These efforts are complemented by the recent launch of the Neuraspace optical telescopes in Beja, Portugal, and Chile, expanding its satellite tracking coverage.

3.1.4. Key space assets and expertise

Portugal has been expanding its space assets in recent years, in particular in relation to **space transportation, ground segment, and satellite programmes**. The country's strategic location in the Atlantic, particularly the Azores, has positioned it as a hub for access to space & return and tracking activities, while new satellite missions have demonstrated its growing technological capabilities. The exhibit below highlights the key space assets of Portugal.

Exhibit 15: Portugal's key space assets



While still a relatively small space player, Portugal has developed assets across verticals of the space sector. One example is Portugal's **ground segment capabilities**, particularly the Santa Maria station in the Azores. Operated as part of ESA's Estrack network, the station was one of the first to feature launcher tracking capability and has supported missions from Kourou, French Guiana, since 2008, continuing to play a vital role in European launch nowadays. Today, the Santa Maria Teleport hosts a wide range of systems, including a Galileo Sensor Station, an EUMETSAT station, and a 15-meter antenna, alongside several private operators. With ongoing expansion, it has evolved into a complex and strategic hub for space communications, tracking, and data services in the Atlantic. Complementing this, the Pampilhosa da Serra Space Observatory (PASO) near Coimbra and Sítio de Observação Ótica do Pico do Areeiro in Madeira strengthens Portugal's SSA and SST capabilities.

Also in Santa Maria Island, the Malbusca Spaceport will offer unique advantages for launch operations, including low air & maritime traffic and vast safety corridors that enable **access to commercially attractive orbits**. To be managed by ASC (Atlantic Spaceport Consortium) who have

recently received their licence to operate a spaceport, it is designed to host multiple launcher operators. The facility aims to capitalise on the growing number of small launch vehicles under development, while also supporting EU in diversifying access to space beyond Kourou.

Portugal is expected to play an important role in Europe's return activities, demonstrated by ESA's recent selection of Santa Maria's spaceport, as landing site for the European Space Rider. The Space Rider is ESA's first reusable, uncrewed orbital laboratory, designed to provide routine access to and return from low Earth orbit (LEO). Similarly, the island is actively being considered for splashdowns of return vehicles, where companies such as SpaceForge have already established their presence viewing Santa Maria as an ideal return site, while others are in the process of submitting license applications.

In 2024, Santa Maria island was chosen as the landing site for ESA's Space Rider's maiden flight, currently acting as the only European return / recovery point.

In 2025, Portugal's space authority **granted ASC the country's first spaceport licence**, paving the way for commercial operations, with the first suborbital flights contracted for spring 2026.

The development of the Centro Tecnológico Espacial de Santa Maria is also expected to bring significant benefits to Azores and Portugal at large. The centre, amongst other activities, will enable the payload integration in launch vehicles and the spacecraft/payload processing after return-to-Earth. Thus, a healthy collaboration between the Technological centre and the spaceport will further attract companies and to Santa maria due to its role in access to and return from space; all contributing to the objective of establishing Portugal as the ideal doorway to, and back from, space.

Portugal has **developed a series of satellite assets, beginning with PoSAT-1**, launched in 1993. This educational microsatellite, built by Surrey Satellite Technology and a Portuguese consortium, was used for technology demonstration & amateur communications. Although now inactive since 2006, PoSAT-1 was crucial for the development of national capabilities in space domains.

In 2024, **AEROS MH-1, a CubeSat** developed by a consortium under CEiiA lead, was launched to support ocean monitoring. Even though it re-entered orbit earlier than planned, the mission provided important lessons and technical experience for future Portuguese satellite initiatives. Additionally, in the same year, **ISTSat-1 CubeSat** developed by the IST NanosatLab at Instituto Superior Técnico was launched as part of the ESA Fly Your Satellite! (FYS) programme. Its mission was to demonstrate the reception of ADS-B signals from aircraft in remote or poorly covered regions, improving aviation monitoring, especially beyond ground-station range.

GEOSAT-1, launched in 2009 as Deimos-1 and manufactured by SSTL, together with GEOSAT-2, launched in 2014 as Deimos-2 and built by Satrec Initiative, were both acquired by GEOSAT in 2020. Commercial and in operation, **GEOSAT-1 provides medium-resolution imagery** for agriculture, environmental monitoring, and land use, while **GEOSAT-2 delivers very high-resolution data** for defence, and disaster management. GEOSAT-2 was the first European fully private satellite capable of providing sub-metric multispectral data. Their acquisition was relevant for Portugal as it consolidated national ownership of Earth Observation assets, ensuring access to critical geospatial data, and positioning Portuguese industry as a competitive player in the EO market.

In January 2025, **PoSAT-2 was launched as the first Portuguese commercial satellite registered in Portugal**, which will be part of a maritime communications constellation (ATON) using AIS & VDES. Developed by Lusospace and partners, it was part of the ESA InCubed programme and later the New Space Portugal Agenda. The same launch also carried **PROMETHEUS-1, a PocketQube developed by the University of Minho** for educational and research purposes, providing hands-on experience for future Portuguese space missions.

It is also important to mention, in the context of Portuguese satellites, that in July 2025, ANACOM, the Portuguese national communications regulator, granted a **licence for the command-and-control operations of EOSSAT-1**, an Earth observation satellite built by Dragonfly Aerospace. Launched in 2023, the satellite is designed to support applications in agriculture and environmental management. The move of the command-and-control operations to Portugal, showcase the development of local ground infrastructure and national capacity.

Portugal's **upcoming satellites highlight both national growth and international cooperation**, particularly the upcoming satellite constellations under the New Space Portugal agenda. Additionally, FOSSA Systems, a Spanish start-up expanding into Portugal with a new R&D centre in Oeiras focused on software development and IoT management tools, is preparing to launch a cluster of three 3U satellites to deliver global IoT connectivity, in addition to their existing satellites in orbit.

Beyond owning space assets, Portugal has developed expertise across the space value chain. While the national industry continues to expand its capabilities in full satellite design and manufacturing, it already **demonstrates a strong track record in critical subsystems, payloads, and contributions to major international programmes,** for example, more recently, the ESA Biomass mission and ESA LISA mission, reflecting growing upstream competencies.

In **Space Traffic Management**, Portugal has become increasingly visible through the leadership of Neuraspace. On **downstream applications, Portugal has cultivated a vibrant ecosystem** of research centres, start-ups, and established companies providing EO services both domestically and internationally. Key sectors include ocean monitoring, climate services, forestry, and agriculture.

Portugal also possesses robust capabilities in **fundamental sciences and advanced research**, which underpin many space technologies. Expertise in astrophysics, mathematics, and physics supports innovation across both upstream and downstream activities. Engineering, computer and data sciences, earth and environmental sciences like oceanography, biology, meteorology and remote sensing. Also, interdisciplinary and emerging fields like life sciences space medicine.

A detailed overview of the key stakeholders driving this expertise is provided in Chapter 3.2.

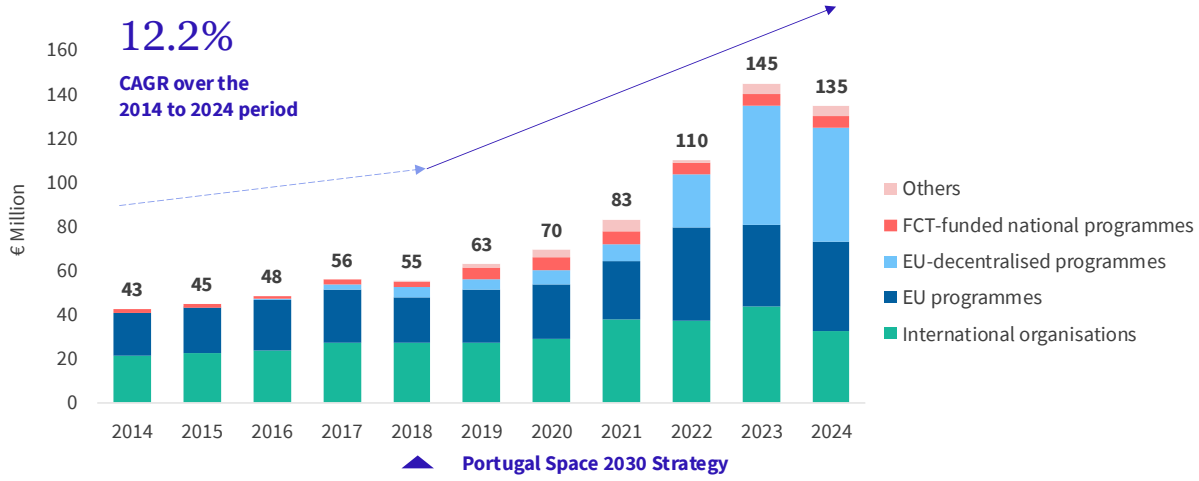
3.1.5. Finance and funding of space in Portugal

Portugal has established a **range of funding frameworks to foster the growth of its space sector** and maximise its contribution to the competitiveness of other industries. Financing for space activities is supported by a mix of national, European, and private sources. On the public side, Portugal contributes to international organisations as ESA & ESO, as well as to the European Union's space programmes (e.g., Copernicus, Galileo & IRIS[2]). In addition, EU-decentralised programmes,

e.g., PRR, alongside domestic funding, particularly through FCT programmes and other budgetary instruments, play a crucial role. These funding mechanisms are discussed in further detail below.

Overall, since the launch of the Portugal Space Strategy in 2018 and the establishment of Portuguese Space Agency in 2019, public funding for the sector has seen significant growth. Previously relatively stable, funding increased from €55 million in 2018 to €135 million in 2024 (not considering defence-related funding), reflecting the **Agency's efforts to implement the national strategy and support key initiatives**. This represents a compound annual growth rate of 12.2% over the 2014–2024 period. Notably, EU programmes and EU decentralised programmes experienced the largest increase, underscoring Portugal's strengthened engagement in European space initiatives.

Exhibit 16: Public funding for space in Portugal



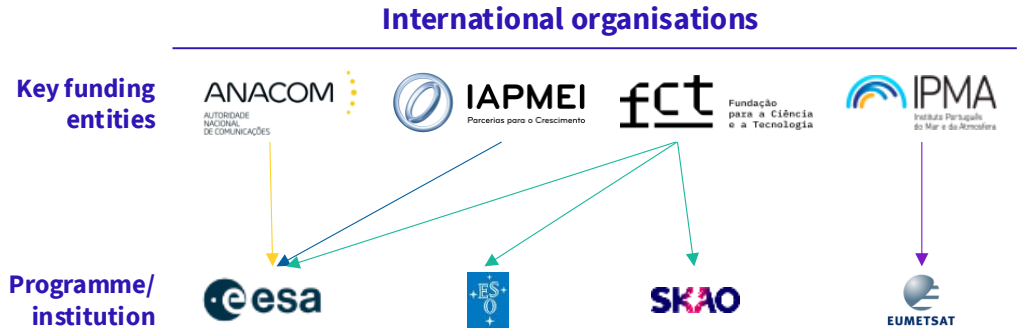
In 2024, funding for Portugal's space sector declined due to a slightly reduced ESA budget to €19 million due to a singularity in programme execution at ESA. Despite this **temporary decline, long-term trends indicate sustained growth**, supported by upcoming recovery and resilience funds that will become more visible from 2025 onward.

International organisations

The Portuguese budget for international programmes as ESA, ESO, SKAO & EUMETSAT has increased over the past 10 years, reaching €32.4 million in 2024. This funding, primarily channelled through national institutions such as FCT, ANACOM, IAPMEI, and IPMA, **enables Portuguese companies, research centres, and universities to participate in major European programmes**, benefiting from contracts, geo-return opportunities, and access to cutting-edge infrastructure and data.

Through ESA, Portugal strengthens its industrial and scientific capabilities across the space value chain, while ESO and SKAO membership consolidates the country's role in global astrophysics research. Participation in EUMETSAT provides critical access to meteorological and climate monitoring data, supporting both national and regional needs.

Exhibit 17: Portuguese funding (national budget) for international organisations



ESA represents the largest share of Portugal's contributions to international space organisations above, accounting for around 70 percent of this group budget in the period 2014 to 2024. It is important to highlight that at the ESA Space19+ Ministerial Council in November 2019, Portugal raised its commitment from €73 million in 2016 to €102 million, a decisive step that enabled the rollout of the Portugal Space 2030 strategy. Additionally, during CM22, Portugal further strengthened its commitment to €115 million. Since 2019, Portugal has leveraged this increased participation to **strengthen its presence in ESA mandatory and optional programmes**, including:

- Mandatory Activities, including the Basic Activities and the Scientific Programme
- Earth Observation
- Space Safety
- Telecommunications – ARTES
- Space Transportation
- Space Exploration

Through ESA's geo-return mechanism, Portuguese academia, research centres, and companies gain access to contracts and project opportunities proportional to the country's financial contribution, directly supporting the growth of the domestic space sector. **By early 2025, Portugal achieved an industrial geo-return of 102%**[5], confirming not only the effectiveness of its subscriptions to ESA but also the maturity & competitiveness of its space industry.

> *"ESA's georeturn drives investment and builds expertise in emerging space economies, but it can prioritise balance over competitiveness and demands sustained funding from smaller countries"*

Between 2019 and 2025, Portuguese companies secured more than **€110 million in industrial contracts**, reflecting the sector's increasing capability to capture advanced work across ESA programmes. This growth is evident in Portugal's expanding role in major ESA missions. In 2025, the country secured its largest volume of ESA funding to date for a single mission through participation in the LISA project, with Portuguese companies such as FHP and Lusospace already contracted to

[5] THE PORTUGUESE SPACE ECOSYSTEM 1st semester of 2025 – Portuguese Space Agency

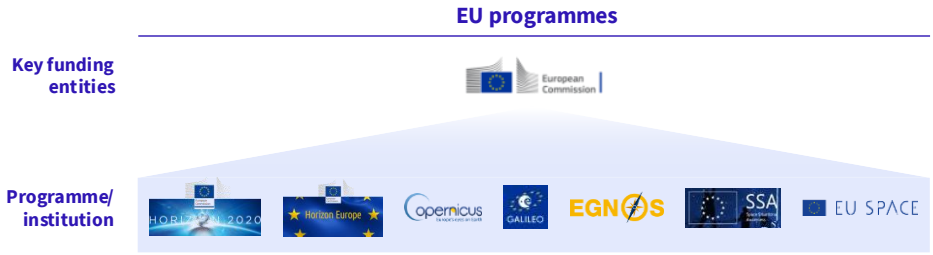
deliver key components. Portugal has also contributed to ESA's Biomass mission, where national companies (Active Space Technologies, Deimos and Lusospace) provided specialised expertise.

EU programmes

The European Union has historically **funded its space activities through successive Multiannual Financial Frameworks (MFFs)**, supporting flagship programmes such as Copernicus and Galileo, alongside research. In the current MFF, covering 2021 to 2027, the EU consolidated its initiatives under the European Space Programme, which now encompasses Copernicus, Galileo, Space Situational Awareness (SSA), and GOVSATCOM, complemented by Horizon Europe.

A key change from Horizon 2020 research programme is the new structure of Horizon Europe, which organises funding into thematic clusters such as health, climate, food, and civil society. Space research and innovation are integrated within the Digital, Industry and Space cluster, ensuring a cross-sectoral approach and stronger ties to industrial and digital transformation goals. Overall, the EU current MFF has allocated **€13.2 billion for EU space activities in this period**, aiming to foster technological innovation, enhance operational capacity, and transform space research into market-ready solutions, reinforcing Europe's competitiveness in the global space sector.

Exhibit 18: Portuguese public funding for EU programmes



Portugal's **participation in H2020 space projects has been extensive, covering a wide range of areas** including Earth Observation and related services and applications (the largest focus), navigation (the second largest), satellite technology, space robotics, and communications. According to the H2020 dashboard, Portuguese programmes within the space thematic priority received nearly €22 million in net EU contributions, with 56 signed grants and 53 unique participants. Key contributors included companies and research entities such as Deimos, IPN, FHP, Tekever, Lusospace, Active Space, D-orbit, Colab +Atlantic , Evoleo, IST, Inergi, and Amorim Cork.

A significant focus has been on **downstream Earth Observation applications**, with projects like MARINE-EO supporting integrated maritime environment monitoring, surveillance, and security, FOCUS, MySustainableForest applying EO data for forestry and environmental management, and NextOcean and HiSea facilitating Copernicus market uptake for fisheries and aquaculture. Other projects such as WaterSENSE and DIANA demonstrate Portugal's involvement in developing EO solutions for water management and resource monitoring.

Another prominent area is **space technologies and industrial competitiveness**, where Portugal contributed to projects such as SpaceCarbon and LEA developing carbon fibre materials and large antennas for European space independence. Contributions to space robotics and in-orbit technologies are represented by projects like EROSSplus and PERIOD, while RETALT addresses

access to space and propulsion technologies. Navigation and GNSS-enabled applications also feature, with mapKITE, AgriBIT, and GAMMS supporting precision agriculture, transport monitoring, and autonomous mapping. Additionally, Portugal has been active in capacity building and outreach, including Astropreneurs, Our Space Our Future, and SpaceEU, fostering education, entrepreneurship, and awareness in the space sector.

Portugal's **participation in Horizon Europe space projects builds on the momentum from H2020**, with involvement across upstream, downstream, and enabling domains. Within Horizon Europe, space falls under the broader "Digital, Industry and Space" cluster, making it challenging to quantify total funding or project numbers exclusively for space. Key Portuguese participants include research centres, universities and companies active in space, e.g., INEGI, GMVIS Skysoft, IPT, Universidade de Aveiro, Universidade do Porto, Instituto Superior Técnico, and Universidade Nova de Lisboa.

Portuguese entities are active in projects supporting **on-orbit operations and in-orbit demonstration**, such as EROSS IOD and SCHUMANN, contributing to future space ecosystems and modular satellite assembly. In **Copernicus and Earth Observation downstream applications**, Portugal participates in initiatives like BLUE-X, FOCCUS, CERISE, NECCTON, AI4COPSEC, and Space4Cities, focusing on maritime and coastal monitoring, climate services, urban management, security, and raw materials tracking. **On navigation and SST/STM**, Portuguese teams are involved in projects such as OVERWATCH, HE_EUSST_MS_TOP1, covering applications from public safety to space traffic management and mission evolution. Portugal also engages in **new space transportation and launcher technologies** via SALTO, EFESTO-2, ENLIGHTEN, and ICARUS, supporting reusability and propulsion.

Additionally, **Portugal is actively participating to Horizon Europe through significant astrophysics projects**, particularly within the European Research Council (ERC) framework. The Gravitas project, led by Instituto Superior Técnico, investigates the nature of black holes and gravitational phenomena. The FIERCE project, coordinated by the Centro de Astrofísica da Universidade do Porto, focuses on detecting and characterising exo-Earths, advancing planetary science and observational astronomy. Meanwhile, the XPACE project, also at Instituto Superior Técnico, studies extreme particle acceleration in shocks to bridge laboratory plasma physics with astrophysical observations.

Portugal has been **actively involved in the EU Space Programme**, with significant participation from national companies and research institutions. In 2020, Portuguese companies secured over €10 million in ESA contracts for six Copernicus Expansion Missions[6], contributing to at least 12 new European satellites. These missions include CO2M (monitoring anthropogenic CO_2), CHIME (sustainable agriculture and biodiversity), CIMR (sea-surface temperature and salinity), CRISTAL (sea-ice thickness and snow depth), LSTM (land-surface temperature), and L-ROSE (monitoring land, cryosphere, and ocean surface dynamics). Companies such as FHP (€4.2M), Active Space Technologies (€3.2M), INEGI (€1.5M), and Critical Software (€0.6M) are contributing hardware and systems to the new satellites.

[6]https://ptspace.pt/copernicus-portugal-wins-contracts-worth-10-million-for-future-missions/

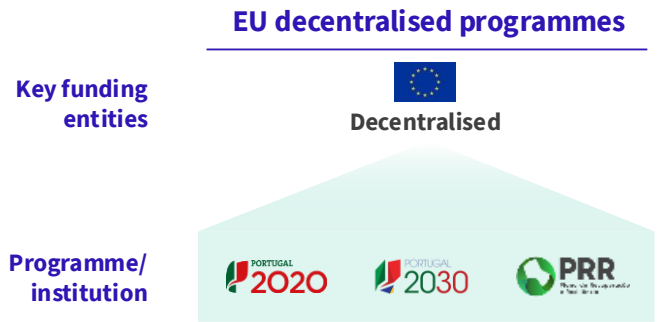
Other important **involvements of Portugal in the EU Space Programme include Galileo, IRIS² and SST.** For example, in 2024, a Galileo Search and Rescue simulation exercise was held in Lisbon, where Portuguese authorities tested the Return Link capability for maritime emergencies. Additionally, another example is the funding provided by the Portuguese Space Agency to projects directly relevant to IRIS² [7]. In the field of SST, Portugal contributes through the PASO observatory, which operates advanced radar and optical systems supporting Europe's efforts in monitoring space debris and ensuring orbital safety. Moreover, through its Ministry of Defence, Portugal is one of the 15 EU Member States participating in the EU SST partnership, coordinated by EUSPA, reinforcing Europe's collective capacity for space security and strategic autonomy.

EU-decentralised programmes

Decentralised EU instruments refer to funding programmes that are **financed by the European Union but administered at the national or regional level**, rather than directly by the European Commission. While the resources originate from EU funds, e.g., European Regional Development Fund and Cohesion Fund, the responsibility for setting priorities, launching calls, evaluating proposals, and allocating funding rests with national governments or regional authorities.

For Portugal, programmes such as Portugal 2020 (PT2020), Portugal 2030 (PT2030), and the Recovery and Resilience Plan (PRR) are examples of decentralised EU instruments. They **allow funding to be tailored to national priorities** (e.g., space, digitalisation, and green transition) **while still aligning with overarching EU objectives**.

Exhibit 19: Portuguese funding of space activities - EU decentralised programmes



Portugal 2020 was a partnership agreement between Portugal and the European Commission that coordinated the action of five European Structural and Investment Funds to support the country's economic, social, and territorial development from 2014 to 2020. With a budget of **€ 25 billion, the programme was aligned with the Europe 2020 strategy** for smart, sustainable, and inclusive growth. Its main objectives included boosting the production of tradable goods and services, increasing exports, and strengthening the transfer of scientific knowledge to industry. It is important to highlight that regional eligibility varied according to GDP levels, with higher funding rates for less developed regions such as the Azores, Centre, and Alentejo, while more developed regions like Lisbon received lower co-funding rates

[7] https://ptspace.pt/portuguese-space-agency-strengthens-the-sector-with-40-million-in-support-for-dual-use-projects/

Under the Portugal 2020 framework, significant resources were channelled to strengthen the national space sector. **Start-ups, established companies, and research institutes alike benefitted from targeted funding**, which supported capacity building and the development of new technologies. Selected examples of these projects are presented in the exhibit below.

Exhibit 20: Non-exhaustive list of space related projects under Portugal 2020[8]

Category	Company/Institution	Project Description
Start-up support	**Instituto Pedro Nunes (ESA BIC)**	Expansion of facilities to incubate ESA BIC start-ups using space technologies, supporting entrepreneurship & cooperation with ESA.
Industry	**Spinworks**	Development of an autonomous visual navigation instrument for EO, lunar, and exploration missions (TRL 5/6).
	Spin.Works	Hardware implementation and validation of control systems for nano- and micro-satellites.
	Active Space	ADVANSS: design and optimisation of additive manufacturing components for space, with support from OHB.
	Lusospace	R&D of an augmented reality system for logistics, autonomous in energy and communication, linked to WMS.
	Tekever Space	CARAVELA: development of building blocks for a micro-launcher dedicated to small satellites.
	Evoleotech	Development of a modular avionics platform for satellites, using COTS components to meet New Space needs.
	Sinuta	STRx: R&D of an electronically steered transmission and reception system for next-gen satellite constellations.
	Omnidea	SADLE: trajectory guidance and control technology for Portugal's first small-satellite launcher
	Omnidea	Omnidea@Arruda: establishment of a factory in Arruda-dos-Vinhos to produce propulsion components and large prototypes.
	Omnidea	BoCAGE: development of compact, low-cost cryogenic pumps for microsatellite launcher engines.
	Omnidea	MAPLE: development of self-pressurised engines for launchers, strengthening national access-to-space technology.
	Omnidea	VIRIATO: design of a reusable suborbital launcher to test systems for a future Portuguese micro launcher.
	Aethra	Development of radar-based satellite monitoring solutions to detect ground movement and infrastructure subsidence.
	RFA Portugal & CEiiA	Development of a micro-launcher, demonstrating Portugal's capabilities in aerospace design and production.
	Xsealence – Sea Technologies	Demonstration of satellite communication and information-sharing technology for miniaturised VMS, applied to fisheries monitoring.
Capacity building	**Associação CIAPA Centro Aeroespacial**	Creation of an active learning ecosystem with innovative teaching methods, digital tools, and practical approaches for aerospace.
	Universidade de Évora	MEDEIA: Upskilling & reskilling adults with high-quality digital resources & micro-credentials in strategic areas incl. aerospace.
	Instituto de Telecomunicações	Development of a portfolio of IP rights for photonics technologies applied to satellite communication systems.

[8] Source: Portugal 2020 "LISTA DE OPERAÇÕES APROVADAS PORTUGAL 2020 reportada a 31 de dezembro de 2024"

	CEC/CCIC	Promote national aerospace companies, improve international visibility, identify SWOTs, and disseminate sector information.
	Associação da Economia do Mar	Align training and professional opportunities for youth with aerospace and maritime sector needs.

Portugal 2030 is the Partnership Agreement between Portugal and the European Commission, defining the strategic framework for applying **€23 billion from 2021 to 2027 across multiple EU funds**, including the ERDF, ESF+, Cohesion Fund, Just Transition Fund, and EMFAF, alongside transfers to the Connecting Europe Facility. The strategy is structured around four thematic agendas, and implemented through 12 programmes. The framework aims to promote a smarter, greener, better connected, and more social Europe. Following Portugal 2020, Portugal Space 2030 continues to support the nation's space ambitions for both industry and research.

Exhibit 21: Non-exhaustive list of space related projects under Portugal Space 2030[9]

Category	Company/Institution	Project Description
Industry	**Hypermetal**	Research on additive manufacturing of metallic aerospace structures using ML to reduce defects and deformation.
	Aethra	WISE platform to monitor civil infrastructure using satellite data for risk management and alert levels.
	N10GLED	M(PS)^2 project for satellite-based quantum key distribution enabling secure global communications.
	Spin.Works	Development of hardware & algorithms for autonomous planetary descent and landing for private and institutional missions.
	Spin.Works	uPGRADE-next: Miniaturised nanosatellite mission for gravimetric field assessment with additional payloads for orbital operation.
	Spin.Works	iDLS-Demo: Integrated system for planetary descent and landing, tested and qualified in orbit.
	VisionSpace Portugal	Reinforcement of IT system security and innovation via cybersecurity and systems administration expertise.
	Atlar	LOPES project: Development of optical sensors for space object tracking in low Earth orbit.
Capacity building	**Universidade do Porto**	Development of optimisation-based solutions to monitor and mitigate space debris collision risks.
	IST-ID	AGROSALT: Monitoring soil salinisation in southern Portugal using UAVs, satellite imagery, and ground-based methods.
	Associação CIAPA Centro Aeroespacial	Creation of educational ecosystem for socioeconomically vulnerable children with active, tech. & artistic learning methods.
	ACIPS	Promotion & internationalisation of the aerospace cluster in Ponte de Sor, including participation in international fairs and missions.

Portugal has also strengthened its international research ties through **international partnerships funded under PT2020 and PT2030**, including the MIT (MIT Portugal Programme), Carnegie Mellon University (CMU Portugal), and UT Austin (UT Austin Portugal Programme. These collaborations foster research and innovation in areas such as space, Earth observation, climate science, advanced computing, and robotics, supporting high-impact projects like satellite-based monitoring systems,

[9] Source: Portugal 2030 "LISTA DE OPERAÇÕES APROVADAS PORTUGAL 2030 reportada a 31 de julho de 2025"

in-orbit servicing technologies, and data-driven environmental studies. Beyond funding, they have expanded joint PhD and postdoctoral programmes, deepened international research networks, and raised Portugal's global scientific visibility.

In the context of post-pandemic recovery, the **PRR has been instrumental in accelerating Portugal's space sector development** as described in the subchapter 373.1.3. Two space-related agendas have strengthened industrial capacity. New Space Portugal involving 40 entities, reinforced to €457 million (following reprogramming), and Neuraspace/AI Fights Space Debris supported by €24 million. Among the PRR's 37 reprogrammed Mobilising Agendas, the aeronautics and space sector saw the most significant boost: an additional €369.94 million was reallocated, making it the top-funded area, and highlighting **strategic importance of the sector to Portugal**.

FCT-funded national programmes

The Fundação para a Ciência e a Tecnologia (FCT), Foundation for Science and Technology, has been, for decades, the primary funding source to the industrial and academic Portuguese space sector. The emergence of other sources of funding for industrial activities has redirected FCT to **support more focused on the scientific community**.

FCT programmes not only **drive fundamental and applied research but also foster the development of highly qualified human capital**, thereby reinforcing Portugal's long-term competitiveness in the space domain. During this period, FCT supported the national scientific community with various instruments, namely,

- FCT Projects
- FCT Internships NASA/ESA
- FCT Researchers
- FCT Funds to research centres

FCT directly funds space-related projects via national calls that **support scientific & technological research**. These projects enable universities, research centres, and companies to collaborate in fields such as EO, satellite technology, and space sciences. For example, the IC&DT Projects Azores (2025) call aims to support research in Space, among other areas, promoting inter-institutional collaboration and strengthening scientific and institutional capacity at the University of the Azores

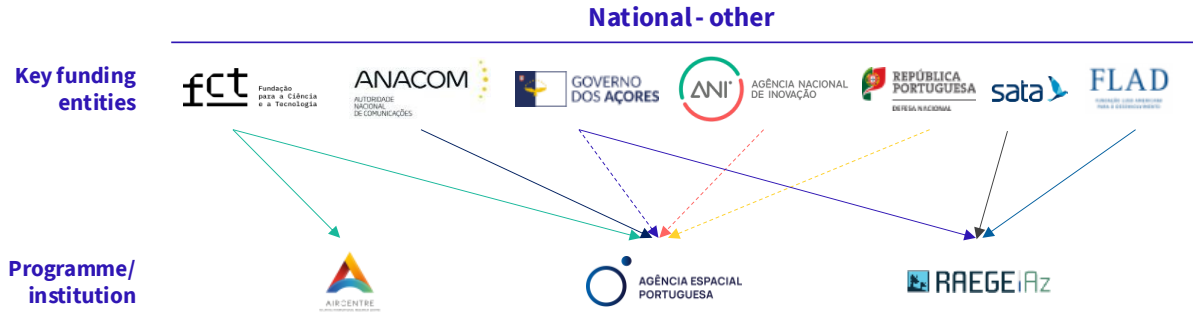
Via dedicated internship programmes, FCT facilitates the participation of Portuguese students and young researchers in training opportunities at NASA and ESA. For example, the 2019 and 2022 editions of internship calls at NASA each awarded six internships. These internships expose participants to cutting-edge research environments and practical experience in advanced space missions, **strengthening Portugal's talent pipeline**. They also create links between Portuguese researchers and leading global space institutions, increasing opportunities for future collaborations.

FCT provides direct grants and scholarships to researchers working in space-related fields, from doctoral fellowships to postdoctoral positions. This funding ensures the **development of a highly skilled workforce** in key domains such as astrophysics, aerospace engineering, and space applications, while supporting retention of scientific talent within Portugal.

FCT also provides funding to Portuguese research centres specialised in space sciences and related fields. Among the supported R&D Units are the Institute of Astrophysics and Space Sciences, the Centre for Astrophysics and Gravitation, the Earth and Space Research Centre of the University of Coimbra, and the Centre for Mechanical and Aerospace Science and Technologies. These funds sustain the operational capacity of research units, support advanced infrastructures, and enable the development of long-term scientific programmes. In addition, FCT also funds Collaborative Laboratories (CoLabs), such as CoLab+Atlantic, fostering cooperation between academia and industry. Through these initiatives, national research centres and CoLabs can **act as reliable partners in European frameworks** such as ESA, Horizon Europe, and the EU Space Programme.

Other national funded programmes

Exhibit 22: Portuguese funding of space activities – other national funded programmes



The Atlantic International Research Centre (AIR Centre) is supported by FCT and focuses on **research and innovation at the nexus of space, climate, and ocean science**. Based in the Azores, it represents one of Portugal's most visible contributions to global sustainability challenges by leveraging satellite Earth Observation data for monitoring the Atlantic. The AIR Centre coordinates multinational projects, for example on climate modelling, marine biodiversity, and renewable energy, serving as a platform for scientific diplomacy. Its funding from FCT ensures integration with national research policy while enabling the centre to attract international collaboration, particularly with countries across the Atlantic Basin.

The Portuguese Space Agency is funded through multiple entities, with the larges roles filled by FCT, and ANACOM, and the remainder coming from the Regional Government of the Azores (GRA), the Agência Nacional de Inovação (ANI), and the Ministry of National Defence (MDN). This **multi-source funding structure reflects the agency's broad mandate**, covering research, innovation, dual-use technologies, and regional development.

The Red Atlântica de Estações Geodinâmicas e Espaciais (RAEGE) is an advanced geodetic station in the Azores, funded through the Regional Government of the Azores (RAA), SATA (the Azores airline group), and the Luso-American Development Foundation (FLAD). RAEGE-Az is part of a joint programme with Spain, **contributing to global geodesy, precise navigation, and climate research**. Its advanced radio telescopes and measurement systems provide critical data for monitoring tectonic activity, sea level rise, and Earth orientation parameters.

3.2. Key stakeholders

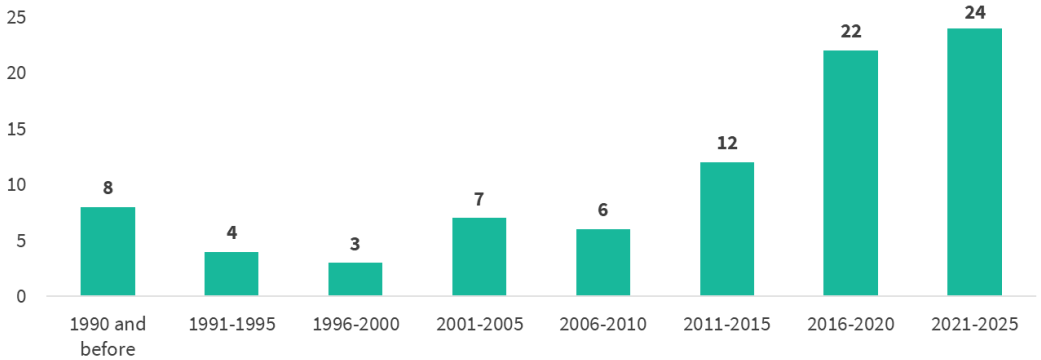
The Portuguese space ecosystem brings together established companies, innovative startups, research centres, and public institutions, each playing a complementary role across the upstream, midstream, and downstream segments of the value chain. As of 2024, the ecosystem included around 156 entities including a growing number of research centres and multiple public entities, with activity spanning from Lisbon and Porto to Coimbra, and extending into the Azores and Madeira. In particular, talent development stakeholders such as universities, research centres, and specialised training institutions will be examined in greater depth in the following subchapter.

3.2.1. Stakeholder characterisation

The Portuguese space ecosystem has developed gradually over the past three decades, shaped by both diversification from established industries and the later emergence of dedicated space companies. By 2024, a total of 82 companies were active in the sector[10]. Early participation came from firms rooted in other industries, such as Amorim Cork, EFACEC, and Thales Edisoft, which began supplying materials and engineering services relevant to aerospace as far back as the late 1980s.

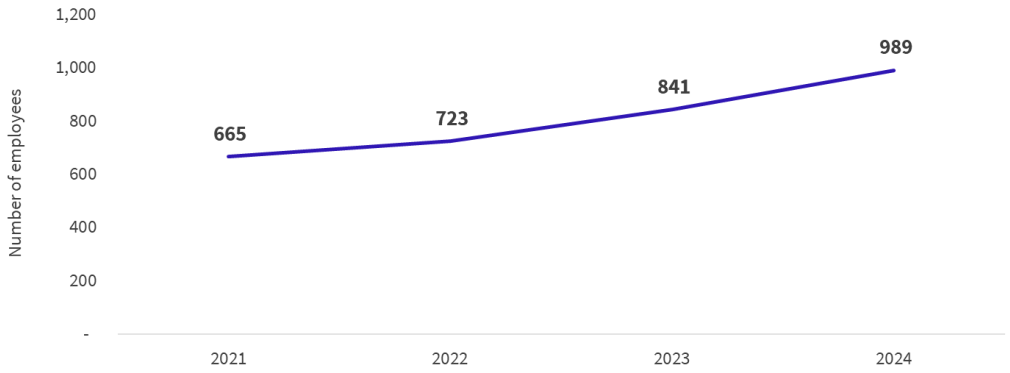
The creation of companies with a primary focus on space gained momentum only after Portugal's accession to ESA in 2000, when international groups such as Deimos Engenheria, and national companies like Critical Software, Tekever, Spin.Works, Lusospace, Omnidea, and Active Space Technologies entered the Portuguese space market. From 2000 to 2018, the sector expanded at a steady pace of roughly 1.9 new companies per year, reflecting incremental but consistent growth. The adoption of the National Space Strategy in 2018 and the establishment of the Portuguese Space Agency in 2019 marked a turning point, triggering a sharper rise in entrepreneurial activity. Between 2018 and 2025, the average rate of new firm creation more than doubled to 4.8 companies per year, underscoring how strategic direction and institutional support have accelerated the diversification and dynamism of Portugal's space industry.

Exhibit 23: Number of space companies founded in each period



[10] Data taken from Portuguese Space Agency provided files

Exhibit 24: Overall growth of space sector industry employees since 2021 (companies only)



This growth trend has been accompanied by a steady increase in the number of people employed in the space sector industry. However, while Portugal has begun to be host to some larger companies, none have yet surpassed 200 employees directly working on space-associated topics. This is reflective of the SME centric nature of the sector, with 79% of the companies listed as having at least 1 employee having a maximum of 20 employees.

Exhibit 25: Company split by number of employees in their space divisions

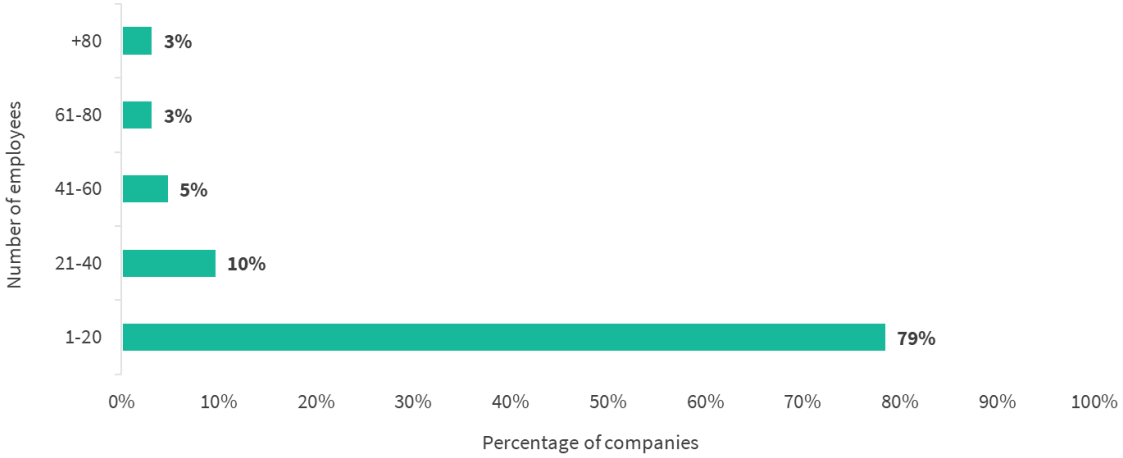


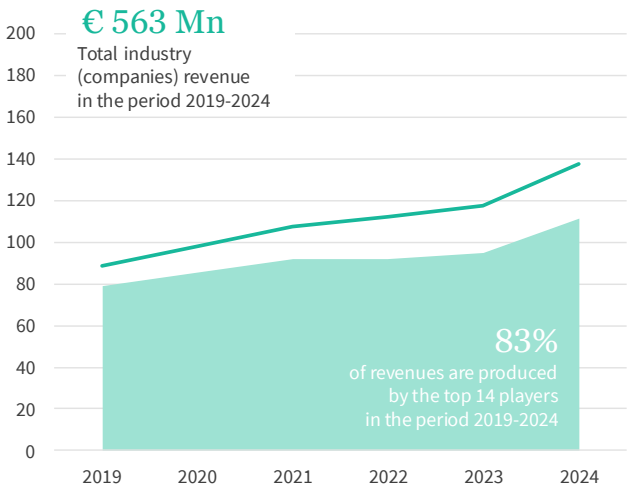
Exhibit 26: Sample of the largest companies by space related employee numbers in 2024

The **overall industry revenues (companies only) over the period in question have also seen a fairly steady increase**. However, as with the employee numbers, a clear pattern emerges with the vast majority of the revenues accounted for by a small minority of companies, in this case 76% of

revenues are produced by only the 14 top players. On the other end of the scale, 14 of the listed companies posted no space related revenues in 2024.

Exhibit 27: Sample of the largest companies by space related revenue in 2024

Exhibit 28: Overall space industry revenues (companies only)



In terms of value chain coverage, **the key Portuguese stakeholders effectively cover all three key segments of upstream, midstream, and downstream, with Upstream representing the most significant chunk of these**. While there are many end users across public entities, municipalities, and private entities, these are beyond the scope of this analysis. However, it is worth nothing that a growing number of academic institutions either opening space related courses or carrying out research in the sector. Moreover, space is also increasingly represented at the institutional level, with the Azores regional government, ANACOM, the Portuguese Space Agency, and the Portuguese Air Force, being some of the key players. In terms of investment, there are a number of Venture Capital firms with space interests such as Portugal Ventures, Caixa Capital, and Armilar Ventures.

Exhibit 29: Sample of entities across the value chain

When considering the industrial landscape more broadly, it is shaped by both domestic firms and foreign-owned companies. Among the latter, Beyond Gravity Portugal is establishing a major Innovation and Digital Hub in Lisbon, with a plan to hire up to 200 specialists in space engineering, digital systems, and artificial intelligence. On the domestic side, Active Space Technologies in Coimbra has built a strong track record in thermal and structural engineering, embedded systems, and mission support, positioning itself as a reliable supplier into ESA programmes. Thales Edisoft Portugal is another pivotal player, responsible for the AEROS nanosatellite mission and for operating the Santa Maria Teleport in the Azores, which supports a wide range of ground-segment activities. Alongside these existing players, major international companies such as GMV, Indra (former Deimos), D-Orbit, Thales, and Dragonfly, are either already present and growing, or planning to enter the Portuguese market.

Portugal also has notable strengths in satellite operations and data services. GEOSAT provides EO data products to both national and international clients, while Deimos Engenharia, now part of the Indra family, and GMV Portugal contribute to mission analysis, navigation, and ground-segment systems, including their roles in the Galileo programme. In the area of space communications, Tekever has developed advanced inter-satellite links, while Lusospace produces space-qualified magnetometers and ADCS components, moreover, both Lusospace and N10gled are also currently developing optical ground stations. The ecosystem is further energised by startups such as SPACEO, a Porto-based venture focused on de-orbiting solutions, and Spin.Works, which develops miniaturised sensors and nanosatellite payloads. These firms highlight the emergence of Portugal's "New Space" generation.

Beyond the private sector, the Portuguese Space Agency plays a central role in coordination and policymaking, maintaining the Portuguese Space Catalogue as a reference tool for mapping the ecosystem. **Innovation support has so far provided by the ESA Business Incubation Centre (ESA BIC) Portugal, managed by Instituto Pedro Nunes in Coimbra, which has supported nearly sixty startups since 2014** and operated through a distributed network of fifteen incubators across

mainland Portugal and the islands. However, this setup is expected to change in the near future as new contracts are being actively discussed with ESA.

3.2.2. Relationships

The Portuguese space sector is characterised by strong collaborative ties across institutions which have proven to have mixed success over the years. Some notable successes include national missions such as AEROS MH-1, done with MIT in the context of the MIT Portugal programme, have brought together companies like Thales Edisoft, CEiiA, Spin.Works, and multiple universities, demonstrating the capacity to integrate upstream and downstream capabilities in a single programme. Broader coalitions such as the New Space Portugal consortium, led by GEOSAT and involving around forty partners, illustrate the way in which firms are banding together to develop satellite constellations, payloads, and data services.

At the entrepreneurial level, ESA BIC Portugal provides financial and technical support for early-stage companies, feeding new ventures into the wider industrial system. These dense collaboration patterns reflect a maturing ecosystem with increasing integration into European value chains, evidenced by Portugal's industrial geo-return of more than 100 percent in ESA contracts between 2019 and 2025.

3.2.3. Regional distribution

With the location of the Portuguese Space Agency headquarters in the Azores, Lisbon hosting major multinational subsidiaries, and start-ups in Coimbra and Porto both seeing sustained interest in the sector, the Portuguese space ecosystem is increasingly polycentric. Coimbra is a hub for Downstream engineering, research, and incubation activities and hosts key leaders like Neuraspace, while Porto and the northern region are gaining ground in the Upstream, EO and space-data applications, with GEOSAT, SPACEO, CEiiA and N3O among the key players. In the Azores, the Santa Maria Teleport and the presence of companies such as Space Forge, ThothX, AQ Analytics and Eyecon underline the region's growing role in space, complemented by research and coordination activities led by the AIR Centre.

Exhibit 30: Key stakeholder distribution

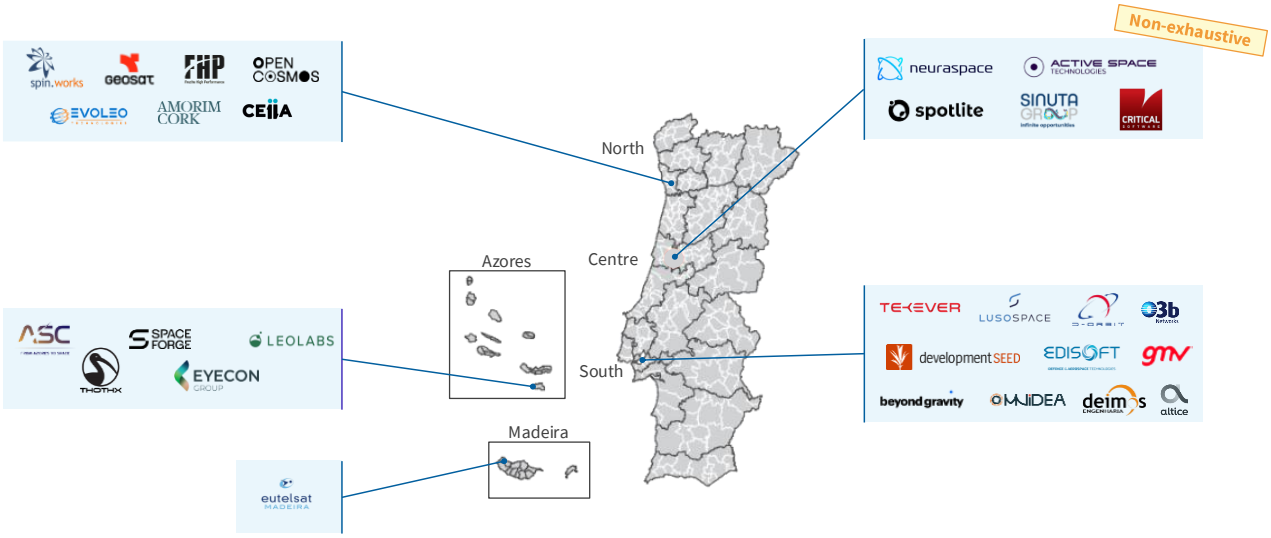
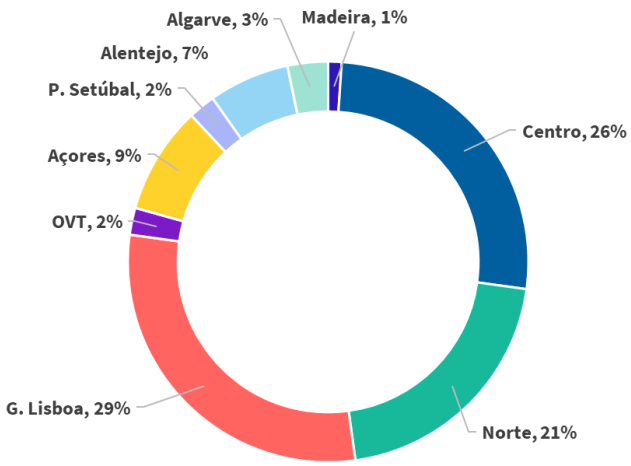


Exhibit 31: Overall stakeholder distribution by region as % of total number of companies



Taken together, this mapping confirms that Portugal's space ecosystem is no longer peripheral but increasingly integrated into European and global networks. The presence of multinational firms, a growing number of SMEs, a viable startup community, and a growing research base provides a foundation for future growth. At the same time**, the geographic distribution of actors highlights the importance of continuing to develop regional nodes, ensuring that the benefits of sectoral growth are spread across the country** and aligned with the goals of Portugal Space 2030. Indeed, it is important to note that the interior of the country remains seriously under-represented as development has focussed around the traditionally richer and more dynamic coastal belt with key nodes in Lisbon, Porto, and Coimbra. Engaging more rural and manufacturing regions such the Alentejo or Évora could be considered to help further spread both interest and investment in the space sector fully across the country.

The above analysis suggest that Portugal is seeing a decent degree of success in its pursual of the Portugal Space 2030 vision's goal to attract leading international players to establish operations in Portugal while fostering entrepreneurial initiatives that deliver high value-added products and services. Major international players are indeed increasingly noticing the potential of the Portuguese ecosystem, though more work continues to be necessary to encourage this, and space research is growing rapidly with increasing cross value-chain cooperation. This path must now be maintained, and further work done to continue fostering national industry while engaging with existing players and encouraging evermore collaboration with Portugal's burgeoning academic space prowess.

3.3. Talent development

Portugal's higher education system has progressively expanded its portfolio of aerospace and space-relevant programmes, establishing a foundation for the national space talent pipeline. Leading institutions as Instituto Superior Técnico (IST, Lisbon), University of Porto (FEUP), University of Aveiro, University of Minho, University of Beira Interior (UBI), FCT-NOVA (Lisbon), and University of Évora provide structured undergraduate and postgraduate degrees in aerospace engineering,

aeronautics, and related STEM fields. In parallel, interdisciplinary programmes in astrophysics, computer science, and sustainability sciences offer complementary skill sets relevant to the downstream space economy. Indeed, though it still faces challenges as will be discussed below, multiple interview respondents named Portugal's steady supply of high-quality graduates as one of its key selling points in the international space arena.

This creation of new programmes reflects a deliberate effort to match steadily growing industrial demand across a rapidly diversifying space sector. Notably, NOVA SBE, already one of the top ranked European business universities, has had a Space for Business course since 2021, highlighting the ever-widening scope of space sector qualifications in Portugal. Most recently, the University of Évora launched an Aerospace Engineering course starting in the academic year 2025 – 2026, these developments raise the **annual intake to 230 students per year, a marked increase compared to the early 2010s.**[11] [12]

Over recent years Aerospace Engineering has consistently ranked at the top of the list of courses nationally with the highest entry requirements in terms of grades.

Nevertheless, the annual output of **230 graduates in aerospace-related disciplines** is above the total number of industry needs, which is to say that the sector cannot absorb such numbers of aerospace engineers, but rather requires a broader range of space related qualifications, especially if a continued growth of the ecosystem is desired. It is worth noting here however, that this output is of course shared between the aeronautical sector and the space sector, with aeronautics still being the larger of the two. However, the issue regarding the breadth of skills required remains, as, in interviews, both established industry actors and a growing number of startups report shortages in systems engineering, digital skills for space, regulatory expertise, as well as in candidates with significant existing experience in the sector, as the academic focus has been primarily on aerospace engineering specifically.

> *"Space related courses (in particular aerospace engineering) are strongly market driven and normally absorb the best students. There was a strong increase of aerospace courses in Portugal that completely over-flood the national market"*

The potential gap between training supply and demand suggests that **Portugal will need to broaden its capacity through specialised certifications, reskilling programmes, and international mobility** initiatives to both ensure a steady supply of not only aerospace engineers but also other key qualifications, as well as supporting experienced industry professionals in transferring their expertise into the space sector in more senior roles.

On the other hand, **multiple universities suggested that few of their graduates from space related courses actually remained in the space sector for work**, with the reason given often

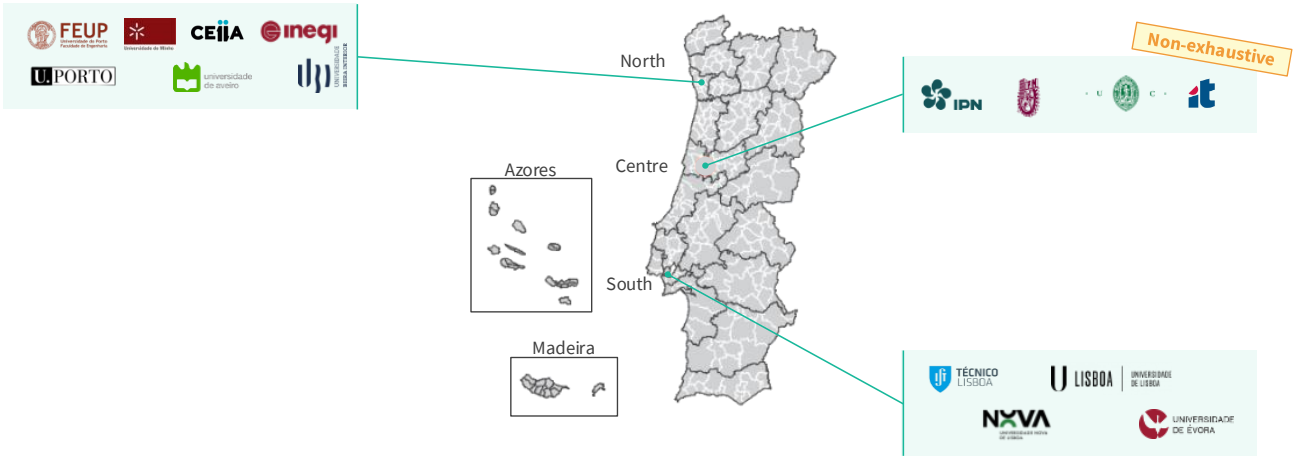
[11] https://ptspace.pt/the-university-of-evora-is-now-part-of-the-national-offering-of-aerospace-engineering-courses/

[12] https://ptspace.pt/new-degree-in-aerospace-engineering-university-of-porto-is-go-for-launch/

revolving around a lack of jobs on offer. This seemingly contradictory finding suggests that there may be mismatch in communication between industry and academia, with companies either unable to communicate their needs and opportunities clearly, or graduates focussed on only a very specific subset of space related jobs. In any case, this presents a clear challenge to overcome and a potential avenue for exploration for the Portuguese Space Agency to take on a more active role in bridging this industry-academia gap that appears to be present.

> *In Portugal, there are very few companies that can/have interest in hiring these students. Duet to strong background in physics and mathematics, these students can easily find jobs in different markets*

Exhibit 32: Key talent formation actors



Talent formation remains fairly distributed across mainland Portugal. Though the **Lisbon–Coimbra corridor has been quite dominant**, anchored by IST and NOVA. The north is strengthening its position with key players such as the University of Porto and the presence of aerospace research at Minho, Aveiro, Évora and Covilhã. By contrast, the Azores and Madeira remain underrepresented in formal training pathways, though growing industrial presence is creating demand for specialised local skills. To address this gap, the Portuguese Space Agency, in collaboration with the University of the Azores, is actively working to strengthen local education in space engineering areas, including the recruitment of a dedicated professor in the field. Bridging these regional disparities is essential to avoid bottlenecks and to embed the Azores more fully into Portugal's broader space value chain.

Portugal's **academic institutions have established a promising base for space-related talent**. However, according to multiple interview respondents, graduate numbers, while impressive, remain overly focussed on Aerospace Engineering specifically and risk falling below industry demand in other areas. Alongside this, the geographic concentration of programmes in the Lisbon to Porto corridor leaves other regions under-represented. That being said, multiple interview respondents also noted that there is already a notable positive feedback loop developing between the output of

qualified workers into the space sector and the boost provided by space activities to further promote and support courses on physics, mathematics, and other related courses.

Portuguese universities and research centres also act as innovation engines, developing technologies that transition into industry and nurturing clusters where startups can thrive. Institutions such as the IPN explicitly stress their dual role, noting that their mission is to *"transform knowledge into innovation and economic value"* by incubating companies and supporting applied R&D that feeds directly into the market. Alongside IPN, organisations like CEiiA, and collaborative laboratories such as CoLAB +ATLANTIC help bridge education, research, and industrial application by providing testbeds, co-development opportunities, and incubation pathways. These actors collectively foster ecosystems where students, researchers, and entrepreneurs collaborate to advance space-related technologies, with direct spillovers into Portugal's growing network of startups and SMEs.

Indeed, acknowledging the key importance of **international partnerships for all areas of the space sector,** Portugal has also established links with NASA and leading American universities, mainly through projects in cooperation with Portuguese space companies and universities, as well as through a protocol for hosting Portuguese students to complete traineeships at NASA premises and establishing dedicated university programmes in Portugal in collaboration with the American universities[13].

3.4. Portuguese space law and the EU Space Act

This section assesses the **potential implications of the EU Space Act on Portugal's existing national space law**, on the operational readiness of regulatory authorities, as well as on the Portuguese space industry.

3.4.1. The Portuguese background

In 2018, the Portuguese Government approved a national space strategy, **Portugal Space 2030 – A research, innovation and growth strategy for Portugal,** aimed at developing an innovative approach to boost the country's space development based on its geographical and entrepreneurial assets. To be implemented in close cooperation with ESA, the European Commission, and other relevant international partners, the strategy aims to promote economic growth and create skilled jobs by advancing space markets, foster satellite data generation through new space technologies and infrastructures, contribute to the country's development and diplomatic relations, and boost the space sector in Portugal through an adapted legal, financial, and institutional framework.

In 2019, Portugal officially adopted its Space Law (Decreto-Lei n.º 16/2019, de 22 de Janeiro), **which established the framework for accessing and conducting space activities**. This was further complemented by **Regulation 697/2019**, detailing the procedure for granting licenses for space activities. In short, these established the first comprehensive legal framework governing national space activities, aligning Portugal with European and international standards while enabling both public and private actors to conduct space activities. The law set out the principles,

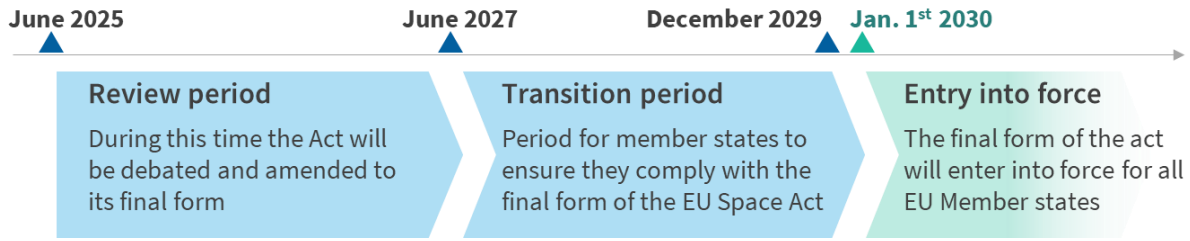
[13] https://www.fct.pt/en/internacional/goportugal/programa-portugal-berkeley/

licensing procedures, and oversight mechanisms for launching, operating, and controlling spacecraft, as well as establishing liability and insurance obligations in accordance with the UN Outer Space Treaty and the Liability Convention. Its primary objectives are to promote innovation, ensure safety and sustainability, protect national interests, and attract private investment into the Portuguese space sector. It envisions space as an engine for technological and economic growth, emphasising international cooperation, environmental responsibility, and the peaceful use of outer space, while clearly defining the roles of the Space Authority, currently exercised by ANACOM, in regulating, supervising, and supporting national space activities.

In 2024, the Portuguese Space Law was amended (Decreto-Lei n.º 20/2024, de 2 de fevereiro) with a particular focus on establishing a national licensing regime for launch centres within Portuguese territory. This was further complemented by **Regulation nº 1206-A/2024,** of October 21st. More broadly, the 2024 update refines and expands the original framework to reflect Portugal's growing ambitions and emerging operational needs, particularly regarding launch capability and national infrastructure. It introduces a dedicated licensing regime for launch centres, establishing clear procedures and government oversight for operations conducted within Portuguese territory, including the Azores. The amendment strengthens environmental and safety provisions through explicit reference to the UN Guidelines for the Long-Term Sustainability of Outer Space Activities, and introduces more flexible licensing categories, such as joint or multi-operator licences for collaborative missions. By formalising the involvement of regional authorities in the national licensing approval procedure, when the activities take place in the autonomous regions, , the amendment balances regional participation with strategic coherence.

As such, Portugal has already adopted a legal and regulatory framework for licensing and supervising non-governmental space activities and has equipped national Space Authority, now ANACOM, and the Portuguese Space Agency with complementary competences and powers. By doing so, it has clearly positioned itself as a leading player and created clarity and predictability that helps attracts companies to Portugal. However, the potentially **forthcoming EU Space Act** would introduce detailed new requirements and institutional processes that **may require adjustments** at both legislative and procedural levels. The analysis below considers the areas of overlap and divergence between the Portuguese regulatory framework and the draft EU Space Act. It provides an overview of some **of the transitional challenge that ANACOM, the Portuguese Space Agency, and the national industry will face** between the Act's expected adoption in mid-2027 and its entry into force on January 1st, 2030.

Exhibit 33: Expected timeline of the EU Space Act



It is to be noted that **the EU Space Act is now only available in the first draft release version**. It is expected that significant amendments may be introduced during the ordinary legislative procedure.

3.4.2. Legislative implications

Portugal is already in a rather favourable position compared to other EU member states, as a comprehensive national regulatory framework has been in place for several years, consisting of five key documents as laid out below. The national framework includes key definitions, licensing procedures, compliance obligations, and provisions for monitoring and enforcement.

Exhibit 34: Overview of evolution of Portuguese space legislation

The Space Law (N. 16/2019)	Resolution N. 55/2019 (RCM)	Statutes of Portugal Space	The Space Law updated N. 20/2024
Established the **legal basis** for the access and exercise of space activities in Portugal	**Officially incorporates** the entity now known as the **Portuguese Space Agency**	Contains the key tenants of the **legal basis and purpose of the Portuguese Space Agency**	**Updated the space law** most importantly establishing a licensing regime for launch centres

The Space Law has seen steadily growing practical application due to the increasing national commercial space activities, particularly in terms of satellite operations and launch activities. Over the last year and a half, Portugal has already licensed its first launch centre (a key step made possible by the 2024 update to the space law), a blanket licence to a constellation of 12 satellites, a command-and-control licence and four launch and C&C licences.

Exhibit 35: A selection of potential impacts of the EU Space Act on Portugal

Key provisions	PT already complies	Potential considerations
All countries **must have an adequate national authority for space**	✓	**Portugal is fully compliant** here as ANACOM already fills this role
All space companies **must comply with national law & the EU Space Act**	~	Portugal will be required to ensure this, which will require **updates to its license application** documentation and procedures
All **license grants must be passed on to EUSPA** for the URSO database	✗	At present no such requirement exists **so a new system will have to be created** to accommodate it
All entities **must comply** with the **EU Space Act's technical requirements**	~	Portugal will be required to ensure this, which will require **updates to its license application** documentation and procedures
All countries must have a qualified technical body for technical compliance assessment	~	Given the division of responsibilities between ANACOM and the Portuguese Space Agency, it is possible that the Agency could fill this role and eliminate the need for a new separate entity

This existing system will not be replaced by the EU Space Act which, it is worth noting, drew from certain aspects of the Portuguese space law, such as the licences for constellations. Rather, **the Act introduces an additional layer of requirements** that apply in addition to existing national procedures. It will introduce highly detailed obligations and requirements regarding collision avoidance, space debris mitigation and disposal, cybersecurity and environmental impact/Life Cycle assessments. These requirements will be directly binding on the national industry. Portuguese operators seeking authorisation for space activities will, from January 2030 onwards, be assessed for compliance not only with the Portuguese regulatory requirements but also with all requirements under the EU Space Act.

As the EU Space Act is directly applicable, there is no strict requirement to amend the Portuguese legislation. However, integrating the EU Space Act obligations and the newly introduced procedures into the national legal framework would provide transparency, clarity and legal coherence for actors in the Portuguese ecosystem. This is particularly important for SMEs and for start-ups that may struggle to interpret and follow two separate legal regimes. Consequently, there may be a need in the future to harmonise legislation or, alternatively, the Portuguese Space Agency could draw up detailed guidance documents for the national industry, provide training and introduce a detailed and early pre-application process, enabling them to inform operators of all requirements and support them in preparing complete and compliant applications.

Another key point of note is that the EU Space Act foresees the creation of a Qualified Technical Body responsible for assessing the technical compliance of any application for licenses. At this stage, it is still unclear whether or not such a body would necessarily have to be separate from ANACOM, given its role as the competent national authority for space. Indeed, Art. 8 Section 1 of the draft act does not mention the possibility that technical assessments are carried out by the competent national authority for space itself. If the draft provisions remain as is, Portugal may have to create a new, separate, technical body. Alternatively, given that the Portuguese Space Agency already operates separately from ANACOM, it is possible that it could be vested with the powers required of this technical body, thereby avoiding the creation of an entirely new entity.

When considering more specific legislative impacts, **there is a definite possibility that Portugal will have to recast parts of its national licensing and oversight regime**, especially for operators and launch centres, to fit a directly applicable, harmonised EU framework on safety, resilience, cybersecurity and sustainability. The draft Act sets EU-wide obligations on debris mitigation and end-of-life disposal, incident/cybersecurity reporting, risk and environmental assessments, and introduces Union authorisations/e-certificates with mutual recognition effects across Member States; this could limit national discretion and may force alignment of insurance/liability and technical standards embedded in Portugal's current law. In short, once adopted (with a planned transition leading to effect around 2030), Portugal would need to amend its space legislation and procedures so national licences, including the one for the Azores launch-centre, interoperate with EU authorisations and minimum technical/cyber/sustainability rules.

On the other hand, **the cybersecurity provisions of the forthcoming EU Space Act could align with Portugal's national priorities for resilience, sovereignty, and strategic autonomy in the space sector**. The Act's emphasis on secure-by-design systems, continuous risk management, and supply chain integrity. Portugal has its own priorities as laid out in the National Cybersecurity

Strategy 2019-202314, and has ongoing efforts to embed cybersecurity into its space governance and licensing framework, particularly following the 2024 amendment to the national space law. At the time, the integration of space operations envisaged in the Act within the broader EU cybersecurity architecture, alongside the NIS2 and Critical Entities Resilience directives, poses some challenges. Portugal's goal is to ensure consistent protection standards across terrestrial and space infrastructures, complementing national ambitions to position Portugal as a trusted Atlantic hub for secure satellite communications and launch operations, promoting both technological innovation and defence resilience, and advancing its capacity to regulate, monitor, and support a secure and competitive space ecosystem with cybersecurity as a key cross-cutting tenant to all its developments.

In terms of efficiency, it is notable that the EU Space Act will in fact represent a step backwards relative to the current Portuguese legislation. This is because, at present, Portugal's 90-day duration maximum for licencing of space activities (and 240-day maximum for licencing a launch centre) is more efficient that the 12 months' timeline expected under the EU Space Act. This reduction in efficiency should not only be questioned during the review phase of the Act, but, if kept, clearly communicated to Portuguese entities who must prepare for the longer lag times between licence application and granting when formulating their commercial plans.

A more in-depth and detailed evaluation of the divergences between the current Portuguese regulatory framework and the EU Space Act is **beyond the scope of this analysis, due to the high likelihood of significant changes to the draft** act during the legislative process. However, it is already notable that the EU requirements would relate, in particular, to the current provisions on licence application under Article 11. "Capacidade técnica, económica e financeira" Article 12. "Descrição dos objetos espaciais a lançar e/ou a reornar e de atividade" or even Article 17, on the cybersecurity strategy, of the Regulation N. 1206-A/2024 "Alteração do Regulamento relativo ao acesso e exercício de atividades espaciais".[15] This is because the addition of extra technical requirements would necessitate updates to current licence application and granting processes.

3.4.3. Organisational and systematic implications

Exhibit 36: Key implications of the EU Space Act

Alignment of forms and processes with new requirements	Expanded staffing requirements	The creation of a new technical approval body
1 Update all forms to collect information needed for PT and EU requirements	1 Expand application processing staff by 2029 to prevent bottlenecks	1 Use the revision period to clarify if an external body is needed
2 Update license application process to encompass all steps for PT and EU law	2 Create automated system for license transmission to EUSPA for URSO database	2 Consider following example of other smaller EU states and using ESA for this

The dual regime, which may be introduced by the EU Space Act, will necessitate updates to Portugal's current administrative procedures. Application forms, review protocols, and internal

[14] https://www.cncs.gov.pt/en/national-strategy/

[15] Regulamento n.º 697/2019 Sumário: Regulamento Relativo ao Regime de Acesso e Exercício de Atividades Espaciais. Regulamento relativo ao acesso e exercício de atividades espaciais. P. 154.

documentation will need to reflect the new EU legal and technical requirements. Furthermore, staff training will be essential to ensure that evaluators of applications understand and can enforce the provisions of the EU Space Act, namely on the key areas of collision avoidance, space debris mitigation, cybersecurity, environmental impact and lifecycle assessment.

As an example of the updates in question, an amendment may be needed to the Portuguese law given the EU Space Act's acceptance, or even requirement in certain circumstances, of double licences in certain conditions, while current Portuguese law has mechanisms to avoid this. However, a more in-depth consideration of this will be needed as the discussion of the draft proposal evolves and how legal technicalities are dealt with - for example, launching from one territory and re-entering in a Portuguese one could be considered different phases and therefore require separate licences, rather than double of the same.

This increase in complexity and workload is likely to lead to a requirement for greater staffing within the Portuguese Space Agency, particularly given the scope and intricacy of the new technical requirements. Moreover, the EU draft requires that all nationally authorised operators are to be registered at the European level. Specifically, the **Space Authority will be obliged to notify EUSPA of all licenses granted** so that operators can be listed in the Union Register of Space Operators (URSO). While this step may not necessarily require legislative amendments, it will require the introduction of new templates and administrative processes.

While the effort involved in carrying out the incorporation of all national and EU requirements into a single application process would be considerable, as already stated above, it is nonetheless advisable as new and small companies seeking to apply for licenses would continue to benefit from a simple point of entry and transparent guidelines and information.

3.4.4. Potential impacts on industry

The EU Space Act is likely to have a significant impact on the Portuguese space industry. The increase in regulatory burden is expected to be considerable, particularly for SMEs and start-ups. In addition to meeting the requirements of the national space law, operators will have to comply with comprehensive new technical obligations under the EU framework.

These obligations carry non-trivial costs. The European Commission's own impact assessment — particularly Chapter 11 of Part 2 — attempts to quantify these, but **the figures provided may underestimate the true impact on small operators and manufacturers**. Industry associations have already voiced concerns, noting that lifecycle assessments alone may require months of dedicated work by multiple employees, putting the estimated cost of 4-8 thousand euros into serious doubt[16]. In addition, projected cost increases for satellite manufacturing in the range of 3–10% could disproportionately affect smaller manufacturers and operators, who lack the scale to absorb such cost increases.[17] This is especially concerning for the Portuguese space ecosystem due to the high presence of smaller companies.

[16] EU Space Act Impact Assessment Report Part 2, p. 36-37
[17] EU Space Act Impact Assessment Report Part 2, p. 36-37

While the **Commission's impact assessment argues that the Space Act will yield long-term cost savings, these benefits remain largely speculative**. For instance, the suggested reduction of 50% of space debris is hard to prove and may be overly optimistic, unless it refers only to EU-originated debris. Other suggestions, such as increases in operational life expectancy of c. 1 year for LEO satellites are also not wholly justified.[18] In any case, the alleged benefits are long-term, while the cost and effort impacts on the industry will arise in the short term as of January 2030.

However, it is also important to note that some benefits are still notable and should provide a not inconsequential boost to the Portuguese space ecosystem. Firstly, the transition to **EU wide regulation standardisation for safety, sustainability and resilience** could help Portuguese entities more easily engage with the wider EU market. This is particularly important for Portugal's significant SME industry as partnerships across EU countries could facilitate their participation in larger projects. Moreover, the emphasis on common cybersecurity, should be able also permit greater confidence in the sharing of information and expertise with partners, as well as potentially stimulate more investment in this field that Portuguese companies could benefit from.

In view of the direct impacts of the EU Space Act, especially on SMEs and startups, it appears essential to ensure necessary support to weather at least the transition period. The European Commission has announced support measures to assist space operators in complying with EU rules and to facilitate capacity building for technologies compliant with the requirements. However, the individual measures under consideration, such as funding for new capacity development, a digital portal for applications, mentoring and coaching, capacity building via guidelines, or the development of new technical standards should be complemented at the national level to ensure tailored support for Portugal's particular priorities. It is therefore essential for the Portuguese Space Agency to reflect on how national operators can be supported more effectively.

To this end, **the provision of comprehensive support to companies** in the preparation of lifecycle and environmental impact assessments **should be a priority.**

Exhibit 37: Respondent expectations of EU Space Act impact's impact

It is worth noting that, while only a minority of survey respondents claimed to expect the EU Space Act to have a negative impact on them, admitted to knowing little about it, and just assuming it might be positive due to standardisation and trade facilitation. Conversely, the few who had done

[18] EU Space Act Impact Assessment Report Part 2, p. 30.

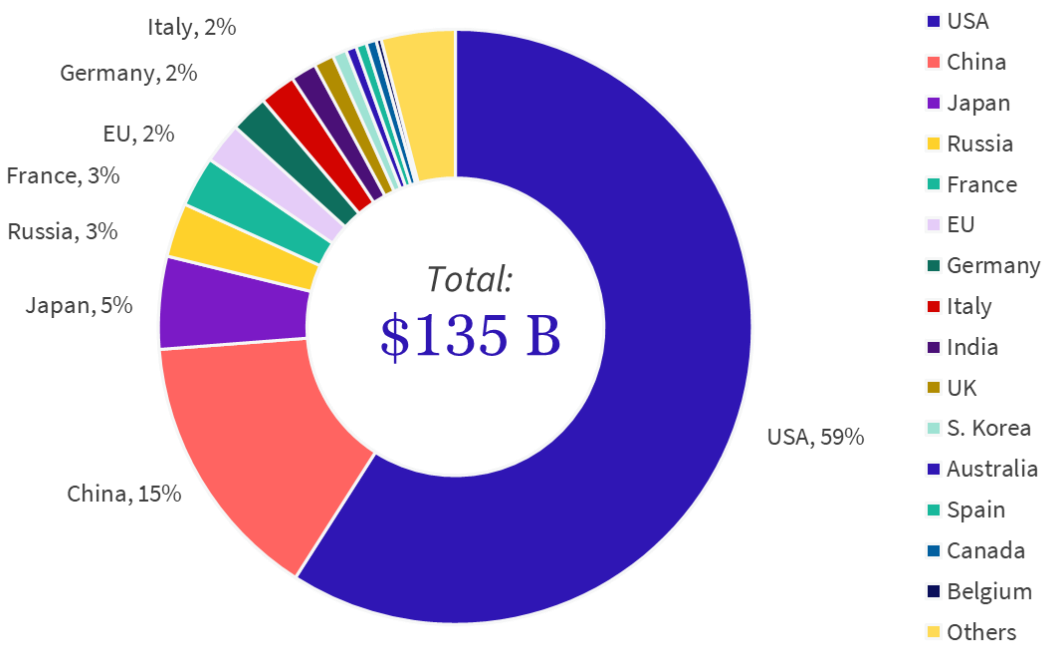
more in-depth research into the proposed Act's details were generally much more cautious about its potential impacts. As such, the results of the Exhibit above should be taken with a degree of caution.

4. Benchmarking of global space sector

4.1. Global overview

Investments in the space sector have been increasing rapidly over the past years, with traditional players such as the **USA continuing to lead, but newer arrivals like China rapidly gaining ground with an increase from 2% of the global space budget in 2000 to 15% in 2024**[19]. Indeed, in 2024 China was only 4% behind the USA in its proportion of global mass launched into space[20]. In 2024, multiple space programs reached significant milestones, including Europe making progress toward reestablishing autonomous access to space and China expanding its influence in space exploration and telecommunications. The year also marked notable political and institutional developments, such as India advancing its ongoing space reforms, South Korea establishing its own space agency, and new space leaders taking office in Europe and the United States.[21]

Exhibit 38: Global space government budget by country in 2024

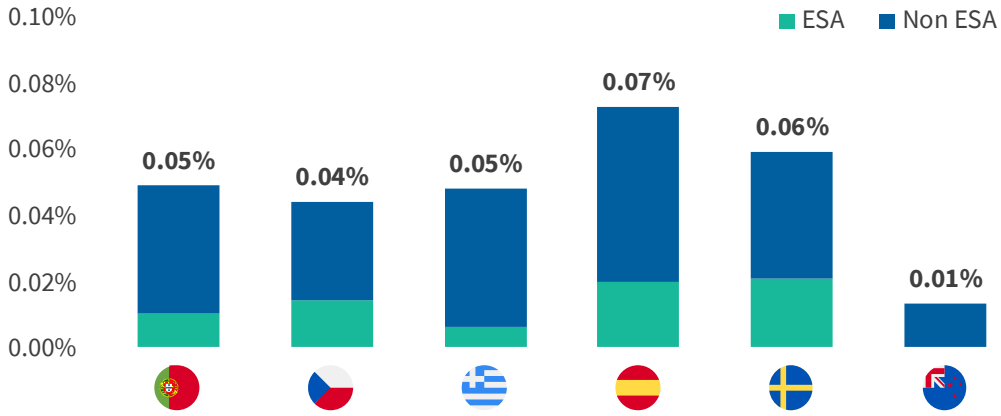


This budgetary growth is indeed a broadly global phenomenon, with Portugal and the benchmarked countries also having seen steady growth in their budgets over the past few years. Within the benchmarked nations listed below, Portugal is third only to Spain and Sweden when considering its space-related expenditure relative to GDP. The following sections will highlight that the allocation of these budgets has followed a wide range of paths. Some, as the Czech Republic, focus more of their funding via ESA, while others, like Greece, maintain a majority of their

[19] https://space-economy.esa.int/documents/tJMabTj61KkdGVOtF6SKw6wGSxicen6ajUWamCG3.pdf
[20] https://space-economy.esa.int/documents/tJMabTj61KkdGVOtF6SKw6wGSxicen6ajUWamCG3.pdf
[21] https://space-economy.esa.int/documents/tJMabTj61KkdGVOtF6SKw6wGSxicen6ajUWamCG3.pdf

expenditure outside ESA and its direct projects. Both approaches have proved to have potentially fruitful outcomes.

Exhibit 39: Space budgets of the benchmarked countries as a % of their GDP in 2024



The explosion of mega-constellations from SpaceX (Starlink), OneWeb, and Amazon's Kuiper has made congestion and orbital debris pressing global issues. This has fuelled **the rise of a dedicated STM ecosystem**, with firms as LeoLabs (tracking), Astroscale (active debris removal), Kayhan Space (AI collision avoidance) and the Portuguese Neuraspace pioneering solutions.

Building on the surge in small satellite missions, there has been a strong push to expand launch capacity, particularly through small launchers, a trend driven by companies as Rocket Lab, Isar Aerospace and PLD. This trend has fuelled the rise of numerous new spaceports worldwide, as SaxaVord in the United Kingdom, Esrange in Sweden, and Andøya in Norway, each aiming to capture a share of the small satellite launch market. Indeed, across the selected benchmarking countries, **launch infrastructure has been increasingly highlighted in national space strategies,** with smaller states as New Zealand and Sweden using their spaceports to attract private capital and be indispensable nodes in global supply chains. Portugal's establishment of the Azores spaceport play a comparable role, acting both as Europe's Atlantic gateway and a magnet for upstream activities.

The upstream segment worldwide is increasingly shaped by miniaturisation, modular spacecraft, and AI integration, with New Space companies such as Open Cosmos and EnduroSat delivering **flexible off-the-shelf platforms and components**. In particular, Portuguese firms have carved out niches in this ecosystem, with companies as Lusospace, Active Space Technologies, Critical Software, and Deimos contributing subsystems, avionics, and software.

The proliferation of small satellites and more accessible platforms has also accelerated the growth of Earth Observation, where the global market is rapidly evolving to meet the **growing demand for near real-time monitoring** to support defence, disaster response, and environmental management. Planet, Maxar, and Satellogic are expanding applications across multiple sectors, fuelled by advances in sensors and AI. Portugal is aligning with these trends with its increasing EO assets and capabilities, in particular in maritime, environment and climate change monitoring.

4.2. Benchmarked nations

A **set of five countries were identified as useful candidates for benchmarking**. The selection was based on a variety of factors, namely similar space budgets, industry maturity, and valuable lessons from mid-tier players. Alongside this, a similar country from beyond the EU was also chosen, to provide a more global comparison and extract potential lessons for Portugal on the global, as well as European, scale. To this end, the selected countries are: **Czech Republic, Greece, Spain, Sweden, and New Zealand.**

4.2.1. Portugal

Context

Political

- Portugal Space 2030 (2018)
- Portuguese Space Agency (2019)
- National space law (2018)

Key stakeholders

geosat, CRITICAL SOFTWARE, LUSOSPACE, CEiiA, TEKEVER

International collaboration

- ESA (2000)
- Atlantic Constellation (2023)
- PESCO EDF
- ESO (2001)

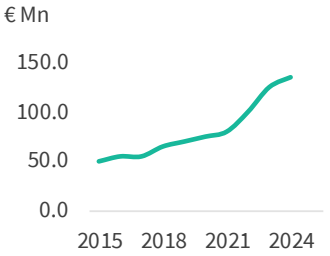
KPIs

€ 285 Bn
GDP 2024

€ 0.14 Bn
Space budget 2024

87
Active space companies

Space budget



Tech & infrastructure

Up | Mid | Down

Verticals

- Space exploration & science
- Technology
- Downstream services (EO, SSA, Cyber)
- Launch activities

Policies best practices

Access to public funding

- ESA BIC helps support new entrepreneurs
- FCT has been the main distributor of civil funds for space
- Funds distributed to international projects (Atlantic Constellation) and local drivers

Access to private funding

- Provision of private funding is limited but may grow as better opportunities emerge
- Examples of recent partially privately funded ventures include:
  - Connected / Open Cosmos
  - Tekever

Regulatory

- A complete and comprehensive national space law
- A clear national strategy up to 2030
- A dynamic engagement with industry to pursue new focus areas

Academia & talent

- Strong academic backbone produces highly educated and attractive talent pool
- Existing industrial base is strong and hold promise for increasing space industry support going forwards

Focussing on the Portuguese government space expenditures in 2024 specifically, they amounted to **€135 million** with almost 88% invested in civil activities.

This investment has been effectively spread over a variety of different avenues, at the civil level, national space expenditures are primarily allocated to domestic activities, funded mainly by the Foundation for Science and Technology (FCT). The **FCT announced investments of €245 million over the 2020-2030** period, as stated in an official document in 2019. National civil expenditures are also **bolstered by the Recovery and Resilience Funds** (RRF), adopted following the pandemic, which are expected to support various activities, including space projects, until 2026. Key programs include the development of **Earth observation satellite programs like the Atlantic Constellation** in cooperation with Spain and ESA, as well as the creation of critical structures to support the growth of the local industry. For example, the Santa Maria Technological Space Centre is a critical piece of infrastructure designed to attract international operations to the island, mainly in the return from space area.

When discussing funding instruments for the space sector in Portugal, it is important to highlight SIFIDE (Sistema de Incentivos Fiscais à I&D Empresarial). This tax incentive scheme allows companies to deduct a significant portion of their R&D expenses from Corporate Income Tax (IRC), with the possibility of recovering up to 82.5 percent of investments. SIFIDE has become a powerful driver for companies to invest in research and development, including space-related projects as it reduces financial risk and increase the return on innovation

Beyond national activities, **Portugal contributed directly to the European Space Agency (ESA) with an envelope of €19.4 million** in 2024. The country also contributes to EUMETSAT through the Portuguese Institute of the Sea and the Atmosphere (IPMA), with a budget of around €5.5 million in 2023, as well as to the European Southern Observatory (ESO) with €2.5 million in 2023 and the Square Kilometre Array (SKA) Observatory since late 2020.[22]

Beyond these financial contributions, **Portugal has also been active in increasing its presence on the international stage of space** with Interview respondents highlighting the significant step forwards represented by the spaceport operating licence awarded to ASC in August of 2025 as a point of particular pride and progress. Moreover, the recent signing of an MoU between the Portuguese Space Agency and Axiom space represents an important step towards bringing key global players into contact with the Portuguese space ecosystem. Not only this, but Space Forge's presence in Santa Maria with a focus on return from space is also of key importance in setting the Portuguese ecosystem apart on the European stage. Portugal has also been active in its engagement of younger students and children in the space sector with initiatives such as European Rocketry Challenge (EuRoC), the "Astronaut for a Day" and Cubesat Portugal seeing high levels of interest and engagement from across the country, though still primarily focussed on the Lisbon – Porto corridor.

Portuguese companies are also active in bringing the Portuguese space sector to Europe with 79% of survey respondents reporting their engagement with European partners. Even more interestingly, 48% of respondents reported engaging in partnerships with entities beyond Europe, primarily in the USA. Such international efforts have been bolstered by Portugal's participation in

[22] Analysis from the 2024 Novaspace Market Intelligence reports

efforts such as the Atlantic Constellation, ESALab@Azores, and other ESA projects. However, when it comes to attracting international funding or new companies into Portugal, multiple interview respondents identified a lack of national market.

> *Portuguese industry needs long-term clients within the public sector to provide incentives for long-term investment in national resources by the private sector*

Education and innovation frameworks provide the other pillar of competitiveness. Globally, universities are expanding aerospace and space-focused degree programs, with new interdisciplinary courses emerging in fields such as sustainability and space systems engineering. **Portugal is part of this trend, with recent programme launches at Porto, IST, and Evora boosting domestic capacity.**

> *Portugal's biggest international selling points it its large number of highly qualified young graduates, eager to get into the field*

Beyond formal education, **the ESA Business Incubation Centres (ESA BICs) have become essential drivers of early-stage growth across Europe, and in Portugal**, having supported numerous startups through seed funding, mentorship, and integration into ESA supply chains. More active engagement with ESA BIC, with details under current negotiation, would give Portuguese entrepreneurs greater access to finance, networks, and international visibility. Moreover, multiple interview respondents identified the importance of ensuring the Portuguese ecosystem's readiness to take advantage of an expected reduction in launch costs as key to its future development, something that a growth in dynamic and scalable start-ups would support.

> *Portugal must prepare its industry to take advantage of the huge reduction in launch costs that is coming soon.*

4.2.2. Czech Republic

Context

Political

- Czech National Space Plan (2020 - 2025)
- Czech Republic Space Strategy (2008 – 2020)
- National space law (draft version in 2025)

Key stakeholders

OHB CZECHSPACE, Honeywell Aerospace, esc Aerospace, SAB Aerospace, ADVACAM Imaging the Unseen

International collaboration

- ESA (2008)
- EUSPA based in Prague
- Artemis Accords (2023)
- PESCO EDF

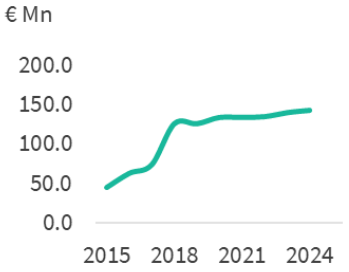
KPIs

€ 321 Bn
GDP 2024

€ 0.14 Bn
Space budget 2024

65+
Space companies

Space budget



Tech & infrastructure

Up | Mid | Down

Verticals

- Space exploration & science
- Launch & propulsion
- Downstream services (EO, GNSS)

Policies best practices

Access to public funding

- Seen significant increase boosted by a 3rd Party Framework Project (C3PFP) agreement with ESA
- Focussed contributions to strength areas
- Rising defence spending in space
- ESA BIC supports entrepreneurs

Access to private funding

- Large international companies such as OHB form the backbone of private funding
- Most companies rely on ESA and public contracts almost exclusively

Regulatory

- A national space law is still under development
- A national space agency is still under development
- The National Space Plan has focussed on increasing competitiveness and expertise

Academia & talent

- The Czech Journey to Space project, initiated in 2024 aims to boost STEM uptake and put a national astronaut in orbit
- Industry-academia clustering (Brno Cluster, CAC, GNSS Centre)

The **Czech Republic has undertaken a number of initiatives in line with those of Portugal**, such as the National Space Plan, but lags behind when it comes to legislation, not yet having a national space law or space agency. That being said, in **2024 the launch of the Czech Journey to Space project** targeted an increase of STEM uptake and the sending of a national astronaut to space, since announced to be via Axiom Space.[23]

In 2019, the government released a National Space Plan for 2020-2025. Through this strategy, the Coordination Committee of Space Activities (CCSA), led by the Ministry of Transport, aims to support the growth of the Czech space industry, ensure its competitiveness, and maximize the return of public investment. The two primary goals outlined through the plan are:

- **Building Czech space capabilities to increase excellence and competitiveness**. The country aims to continue to create a suitable environment encouraging companies and the academic sphere to build innovative solutions. The government also wants to create synergies between small companies and prominent industries to maximize the return on investments and stimulate private investment.
- **Being active in international relations to increase the visibility of the nation**. The government aims to strengthen bilateral cooperation with spacefaring countries, mainly European partners.

Indeed, the growth of the space Czech industry has also been supported by the aforementioned Czech Journey to Space initiative, as **national companies such as M5 have been able to leverage the government partnership with Axiom Space** to forge their own agreements for greater commercial cooperation and expansion.[24] Indeed, this initiative has also helped strengthen the Czech academic sector by promoting STEM uptake and thereby increasing their available talent pool

However, the **Czech Republic's governance model in space is still fragmented and lacking singular direction**. This is in large part due to the absence of either a space law or a National Space Agency. The structure still has little interconnection between domestic & international space efforts.

This lack of internal coordination has not prevented international cooperation from being at the centre of most, if not all, of the Czech Republic' space activities, with **implementation generally going through the European Space Agency** (ESA), which it joined as a full member at the end of 2008. Since then, there has been a significant increase in the participation of Czech companies in space projects, which increasingly produce launchers, satellites and ground segments. In addition, the European Union Agency for the Space Programme (EUSPA) continues to expand its operations in the Czech Republic. After signing a joint memorandum of understanding in February 2023, the Czech government will support the relocation of the seat of the agency from Prague to the nearby Nova Palmovka facility in 2025. The new facility will offer enhanced security and additional pace necessary for its functioning, together with use of a data centre.

[23] https://md.gov.cz/Media/Media-a-tiskove-zpravy/Startuje-projekt-na-co-nejvetsi-vyuziti-potencialu?lang=en-GB; https://www.axiomspace.com/news/czech-republic-national-astronaut

[24] https://md.gov.cz/Media/Media-a-tiskove-zpravy/Startuje-projekt-na-co-nejvetsi-vyuziti-potencialu?lang=en-GB; https://www.axiomspace.com/news/czech-republic-national-astronaut

When considering private sources of funding, the only payers of note are major multinational companies such as OHB, Honeywell Aerospace, and SAB Aerospace, with **the majority of financing still being tied to either direct Czech state investment, especially in defence, or ESA** projects, in particular tied to the 3rd Party Framework Project between ESA and the Czech Republic that has been active since 2017[25].

Best Practices

Czech Journey to Space: astronaut opens new business opportunities

One of the most notable and impactful space initiatives undertaken by the Czech Republic is undoubtedly **the Czech Journey to Space, and its commitment to sending a Czech astronaut to space.** This has not only acted as linchpin in its drive to increase STEM uptake, but also already begun catalysing commercial opportunities for its national industry and facilitated its interaction with major international players such as Axiom Space. Indeed, launching an astronaut with an international partner offers a range of strategic benefits for emerging space nations. It enhances national prestige by showcasing technological advancement and serves as a powerful diplomatic and marketing tool both domestically and globally.

Such missions also have strong inspirational value, encouraging students and youth to pursue STEM education and careers. Additionally, they help build strategic alliances and capacity by fostering partnerships with public and private sector players. Beyond these, spaceflights offer unique opportunities for scientific research in areas like biology and medicine. Various launch partners could be considered, but Axiom Space could be a feasible option, with estimated costs of between **€55 and €75 Mn, this option is particularly interesting given the memorandum of understanding already in place between the Portuguese Space Agency and Axiom Space for advancing bilateral cooperation in space.**

Turkey provides a good international example of the successful execution of such a strategy. Through the pursuit of human spaceflight by partnering with Axiom on their third mission to the ISS. As part of the mission, a Turkish military pilot, Alper Gezeravcı, was spent three weeks on the International Space Station as the first Turkish astronaut. This milestone was hailed as “a new symbol of a growing, stronger, and assertive Turkey” by President Erdogan, while the Industry and Technology Minister declared that the mission was “a first, but it will not be the last/ A new page has been opened in space science & technologies for Turkey”. Overall, the mission served to deepen partnerships with international actors, market Turkey’s burgeoning space sector, and encourage interest in space education, as multiple calls between students and the ISS astronauts were held during the mission.

3rd Party Framework Project: bespoke mechanism enabling channelling of direct ESA support

Drawing on the Czech Republic’s experience with the Third-Party Framework Project (C3PFP), **Portugal could benefit from creating a dedicated framework programme administered in partnership with ESA**. Such an approach would combine national strategic control with ESA’s technical oversight, giving Portuguese companies and research groups structured access to European value chains while building long-term competitiveness.

[25] https://www.czechspaceportal.cz/wp-content/uploads/2020/08/NSP2020-2025_EN.pdf

The Czech model shows the value of funding projects through ESA's procurement and evaluation systems while retaining national authority over priorities and budgets. This ensures that proposals meet international quality thresholds and familiarises SMEs, universities, and research centres with ESA's contractual and technical requirements. For Portugal, this would act as a "training ground," preparing domestic actors for more effective participation in ESA Optional Programmes and ensuring alignment with Portugal Space 2030.

C3PFP also demonstrates the importance of regular, transparent calls for proposals that support collaboration across SMEs, primes, and academia. By structuring calls around national priorities, such as Atlantic EO services, SmallSat payloads, or cybersecurity, Portugal could create a predictable pipeline of opportunities, stimulate partnerships, and encourage higher-risk innovation. ESA's role in contract management would enhance credibility and trust, while national institutions would ensure that funded projects directly contribute to Portugal's strategic goals.

4.2.3. Greece

Context

Political

- Ministry of Digital Governance (2017)
- Ministry of National Defence's Space Directorate (2021)
- Hellenic Space Centre (2019)
- Greek space law (2017 + 2020 amendment)

Key stakeholders

International collaboration

- ESA (2005)
- Artemis Accords (2024)
- PESCO EDF
- GOVSATCOM program
- Eumetsat

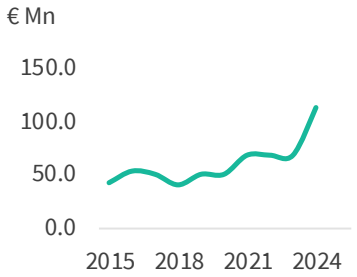
KPIs

€ 238 Bn
GDP 2024

€ 0.11 Bn
Space budget 2024

60
Space companies

Space budget



Tech & infrastructure

Up | Mid | Down

Verticals

- Dual-use technologies
- Earth Observation
- Space technology
- Satellite communications

Policies best practices

Access to public funding

- Recently boosted thanks to the 2024 National SmallSat Programme with first contracts granted in 2024
- MilSatCom is expected to expand via participation in GOVSATCOM

Access to private funding

- There is little access to private funding
- Venture Capital is rare, and most companies survive on public and ESA contracts

Regulatory

- Challenges are posed by the split management of the space sector
- A coordinated effort focussing on SmallSats has helped focus funding and given direction to national entities

Academia & talent

- The National Observatory of Athens (NOA) acts as a key centraliser of expertise and technology
- National Satellite Space Project & Hellenic AIT facility (from recovery plan)

Greece provides a variety of interesting cases for study compared to Portugal, particularly as it is following a markedly different path to the previously discussed Czech Republic. Since 2017, the **Ministry of Digital Governance has been the competent administrative authority for all civilian space matters**. In parallel, the development of applications for defence purposes is coordinated with Ministry of National Defence's Space Directorate within the General Staff, which was created in 2021. In 2018, the Ministry of Digital Governance founded the Hellenic Space Agency. However, in 2019, the agency was restructured into the Hellenic Space Centre (HSC), which is currently active and focuses on developing space technologies and a national space strategy. Plans to develop a more broadly competent space agency have been mentioned in 2019, but no timeline has been publicly disclosed.

While the country has steadily increased its participation in ESA's programs, in 2024 **the government outlined a National SmallSat Programme for the development of thermal, SAR, and optical SmallSats** in collaboration with national and European partners. This plan will increase national investments beyond annual ESA contributions in 2024, which have been reduced compared to 2023. National priorities remain in Earth observation, navigation, space security and technology. In addition to its growing SmallSat programme and national strategy in Earth observation and space security, Greece's role in the EU's GOVSATCOM initiative marks a significant strategic milestone. **In December 2024, Greece was selected, alongside Germany, as the site for one of just two GOVSATCOM Hubs** to provide secure satellite communications for critical infrastructure, defence, and crisis management across the European Union[26]. This appointment not only reinforces Greece's status as a trusted partner in EU security architecture but also strengthens demand for national capacities in secure space-based communications. In practical terms, hosting a GOVSATCOM Hub is likely to attract specialised investments, enhance institutional cybersecurity capabilities, and provide new business opportunities for domestic firms seeking to demonstrate flight heritage and support secure comms solutions at the European level.

Further research is conducted by the National Observatory of Athens (NOA), which contributed to most national and international science and exploration activities. **NOA is formed of three institutes: IAASARS**, specialising in astronomy, astrophysics, space science and remote sensing; **IERSD** specialising in environmental monitoring, meteorology, climate and climate change; and **GI** specialising in Earth's physics and relevant studies conducted through Earth Observation. Significant contributors to the Greek national space ecosystems include various academic clusters, from which most of the national satellites are developed as technology demonstrators.

In **2017, the Parliament adopted the Greek Space Law**, which was updated through an amendment in 2020. The nation's law in its most recent update **focuses on**:

- Strengthen **national security and defence**, especially with the utilisation and development of space infrastructure, to ensure national autonomy in safety and security.
- **Develop the Greek space industry** and maximise the integration of Greek companies into the European industrial space landscape.

[26] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32024D3195

- **Utilise space data and develop relevant applications**, fostering the integration of space into society and economy to support public policies and business development.
- Support **space research and innovation**.

Such objectives are **to be achieved thanks to the development of small satellite capabilities**, achieving flight heritage, developing ground infrastructure, and exploiting existing data. In 2020, the country also released its Digital Transformation 2020-2025 strategy, including multiple objectives related to space pivoting around improving satellite-based connectivity.[27]

Best Practices

2024 National SmallSat program: providing clear targets and funding for industry

Of particular note for the development of the Portuguese space sector is the **impact of the emphasis placed on SmallSats by Greece**. Given its limited budget and resources, this decision to provide direction for both public and private efforts towards a singular key technological vector, especially relevant for Greece given its increasing security concerns and ever worsening climate impacts, has allowed for more to be done with less. All other priorities and objectives, as outlined above, have then been targeted to revolve around the SmallSat focus.

Indeed, such **a focus on key niches has already served Portugal well,** via PRR it is actively developing a full value chain is being developed small sats in Optical, SAR and VDES. **This success could now be further built upon in areas of interest such as Cybersecurity**, **Downstream services, or Subsystems** to help provide greater focus for industry, as well as open up the potential for larger funding packages in targeted areas. This could act both as an incentive for start-ups and increase the attractiveness of long-term projects for larger national or international companies.

NOA: A National Coordination Hub for EO and Space Science Expertise

The National Observatory of Athens (NOA) is a valuable model that Portugal could draw inspiration from, functioning not only as a research institute but also as a central coordination centre for Earth sciences, space sciences and environmental monitoring across the Greek ecosystem. NOA integrates infrastructure, expertise, and institutional presence to align academic research, public policy needs, and international programming, offering a holistic template for centralised talent coordination.

NOA, through its Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing (IAASARS), operates EO infrastructure such as Sentinel ground stations and provides operational services in wildfire detection, atmospheric monitoring, and climate modelling. It also represents Greece in GEO initiatives and acts as a national Copernicus data hub, showing how a single entity can link scientific expertise with operational services and European-level programs. **NOA is also a focal point for talent coordination, pooling the capabilities of universities, research institutes, and government agencies**. Its leadership in projects such as ESA's NELIOTA lunar monitoring

[27] Analysis from the 2024 Novaspace Market Intelligence reports

campaign and regional wildfire resilience initiatives demonstrates how a central hub can translate scientific capacity into international visibility and societal benefits.

4.2.4. Spain

Context

Political

- National Aerospace Security Strategy (2020)
- National Space Strategy (2019-2023)
- Strategic Project for Aerospace Economic Recovery and Transformation (PERTE) (2022)
- Spanish Space Agency (2023)

Key stakeholders

SATLANTIS, gmv, PLDSPACE, hisdeSAT, Alén, INDRA, INTA

International collaboration

- ESA founding member
- Artemis Accords (2023)
- Mars Curiosity & Perseverance
- Atlantic Constellation

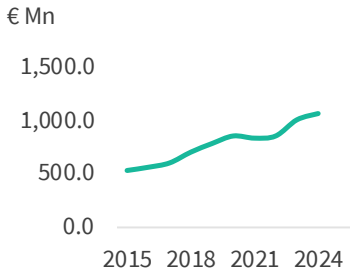
KPIs

€ 1,592 Bn
GDP 2024

€ 1.06 Bn
Space budget 2024

108
Space companies

Space budget



Tech & infrastructure

Up | Mid | Down

Verticals

- Launch
- Satellite communications
- Space science and exploration
- Downstream services (EO, PNT)

Policies best practices

Access to public funding

- The PERTE plans to inject over €4.5 billion to ensure the development of the local space ecosystem
  - Focus on EO, Quantum Key Distribution, Space Technology, and Small Launch
- ESA BIC supports entrepreneurs

Access to private funding

- Private equity fund Nazca Aeroespacial y Defensa I FCR fund (€400 million target))

Regulatory

- Spain is seeking to centralise its space policy via the Space Agency
  - Defence and Civil space are being increasingly unified through it
- There is not yet a national space law

Academia & talent

- Spanish future astronaut Pablo Álvarez Fernández graduated 2024
- Spain is estimated to have **allocated €80 million technology programs** through the Instituto Nacional de Tecnica Aerospacial in 2024

Spain has been active in the space sector for several decades and is now a mature player in the space industry. An important milestone in Spain's space history was the creation of the National Institute for Aerospace Technology (INTA) in 1942. More recently, the Spanish government initiated in mid-2000 the Spanish Space Strategy Plan 2007-2011. Since then, space funding and policy has mostly been treated within generic science-related programs such as the Spanish Strategy for Science, Technology and Innovation 2021-2027, focusing on Astronomy and Astrophysics.

In 2022, the government approved the Strategic Project for Aerospace Economic Recovery and Transformation (PERTE) aimed at strengthening Spain's position in the space industry, notably through the creation of a dedicated agency. **In March 2023, Spain's Council of Ministers voted to approve the statute of the Agencia Espacial Española** (AEE), a dual agency overseen by the Ministries of Science & Innovation (MCI) and Defence (MDEF). According to its statute, AEE's missions notably include Contribution to national security; Promotion of the Spanish sector; Promotion of the national industry; Protect the local industry's interests at the international level; Coordination of Spanish stakeholders' activities in the sector; National representation in international events; Contribution to international space policies. In parallel, the government adopted the National Security Strategy 2021 establishing a framework for aerospace activities in the defence field. In 2022, the government decided to rename its Air Force as the Air and Space Force to reflect the efforts made in the aerospace sector.

Meanwhile, **Spanish autonomous communities have also developed space projects** in Galicia, Andalucia and Euskadi. In late 2020, Catalonia announced its first New Space strategy and space agency and plans to launch a small constellation. These territorial projects shall be coordinated via a Territorial Committee of AEE.

In terms of access to funding, the aforementioned **PERTE is one of the primary public funding mechanisms, having been announced to inject over €4.5 billion into the national aerospace ecosystem between 2021 and 2025**[28]. This financing has been spread over a number of sectors but focussed especially on Focus on EO, Quantum Key Distribution, Space Technology, and Small Launch. On the private funding side, Nazca have announced private equity funds aimed at the space sector, with a target size of €400 million, which would make it the second largest in Europe and a first commitment in this field in Spain[29]. While this is currently one of the only major sources of private funding for the sector, it does represent a key first step that, if successful, may prompt more investments in the future.

Another notable feature of Spain's space innovation framework is the **role of the Centro para el Desarrollo Tecnológico y la Innovación (CDTI), which not only funds R&D projects but also invests directly in private companies through equity participation.** This mechanism allows the Spanish government to take a minority stake in strategically important technology firms, providing patient capital that supports scaling and internationalisation while ensuring public returns if companies succeed. In the space sector, CDTI's investments have strengthened the competitiveness

[28] https://planderecuperacion.gob.es/como-acceder-a-los-fondos/pertes/perte-del-sector-aeroespacial

[29] https://www.nazca.es/en/noticias/nazca-capital-launches-the-largest-spanish-private-equity-fund-specialized-in-aerospace-and-defense/

of emerging satellite, launch, and downstream service providers, bridging the gap between research funding and market capitalisation.

For Portugal, a comparable mechanism could offer a powerful lever to stimulate private investment and accelerate commercial maturity in high-potential space companies. **Adapting the Spanish model within the framework of the Portuguese Space Agency or a national innovation fund could enable public institutions to take small equity positions in early-stage ventures** that align with national priorities, such as Earth Observation services, secure communications, or launch technologies. This would not only attract co-investment from domestic and European sources but also ensure that public funding supports the creation of a self-sustaining, strategically relevant industrial base in the Portuguese space ecosystem. For example, CDTI has taken equity stakes in several high-technology firms, including PLD Space, supporting the development of Spain's first reusable rocket, and Satlantis, a leader in high-resolution optical payloads. These investments have helped both companies scale production, attract private co-investors, and position themselves as key suppliers within the European space industry.

Alongside these efforts, **Spain has also continued investing in its education and talent pool, with the Ministry of Science, Innovation, and Universities committing to investing €70** million with support from the EU's Covid-19 recovery fund to advance the country's space technology sector. Moreover, Spain has continued its efforts in engaging with ESA to maintain its position as a key contributor to public space science efforts, with their latest astronaut graduating from ESA's European Astronaut Centre in April 2024[30].

Best Practices

Supporting national industry: promoting the creation of large integrators to drive industry

A key area in which the **Portuguese space ecosystem could learn from Spain is by attempting to follow in the development of a strong industrial base anchored by both large integrators and a broad SME network**. Spain's space sector includes more than 100 entities, with companies like Airbus Spain, GMV, SENER, Deimos and others acting as system integrators, supported by a large constellation of SMEs. This layered structure gives Spain resilience, global competitiveness, and bargaining power in ESA/EU programmes. Portugal's ecosystem, though dynamic, remains SME-driven and fragmented. A clear pathway to nurture one or two anchor integrators, while reinforcing SME participation in global supply chains, would strengthen Portugal's sectoral profile and enhance its capacity to lead, rather than only participate, in major European projects.

Providing long-term prospects: giving industry the certainty needed to invest and expand

Another best practice is **Spain's consistent investment in long-term national programmes that complement ESA/EU funding**. Spain's government regularly allocates direct national budgets to space science, Earth observation, and telecommunications, creating demand signals that enable companies to scale and attract private capital. Portugal, by contrast, relies heavily on ESA and EU programmes. Establishing a long-term national space investment framework, even at modest scale,

[30]https://www.esa.int/Science_Exploration/Human_and_Robotic_Exploration/Astronauts/Pablo_Alvarez_Fernandez

would demonstrate commitment, ensure continuity, and create opportunities for Portuguese firms to mature technologies between ESA/EU contract cycles.

Making space mainstream: integrating space into cross-cutting national priorities

Spain has successfully embedded space into cross-cutting national priorities such as defence, climate services, and digitalisation. Spanish companies benefit from space being positioned not as a standalone sector but as a contributor to wider industrial and societal agendas. For Portugal, mainstreaming space into domains such as ocean monitoring, climate resilience, and Atlantic security would expand the customer base beyond institutional space actors, making the sector more relevant domestically and internationally. This approach has wide support from many interview respondents who felt that Space was still perceived as overly niche by the political establishment and therefore not supported or consulted by any departments not directly related to it.

4.2.5. Sweden

Context

Political

- Swedish Space Strategy (2019)
- National Space law (under development)
- Space Action Plan up to 2030 (2024)
- Swedish National Space Agency (1972)

Key stakeholders

SSC, OHB SWEDEN, AAC CLYDE SPACE, beyond gravity, OMNISYS INSTRUMENTS, GKN AEROSPACE

International collaboration

- ESA founding member
- Artemis Accords (2024)
- APSS (2023)
- Esrange Space Centre

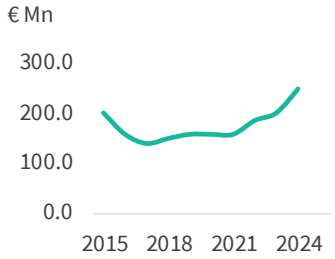
KPIs

€ 559 Bn
GDP 2024

€ 0.25 Bn
Space budget 2024

30
Space companies

Space budget



Tech & infrastructure

Up | Mid | Down

Verticals

- Launch
- Space science
- Ground segment
- Defence and Security

Policies best practices

Access to public funding

- Sweden invests primarily via ESA programmes such as ESA BIC (70-80% of the space budget)
- The primary focus on public funding in Sweden is the Esrange Space Center at Kiruna

Access to private funding

- Has significant private funding pedigree:
  - AAC Clyde Space went public on Nasdaq and raised capital on stock market
  - Heart Aerospace secured significant series B funding in 2024 via private capital

Regulatory

- Prepared key launch infrastructure in parallel with required regulation to allow commercial use of it

Academia & talent

- Second Swedish astronaut on the ISS in 2024
- The KTH Royal Institute of Technology hosts a KTH Space Centre for Swedish space research and technology
- The **Swedish Space Data Lab initiative** launched in 2019 by AI Sweden, the SNSA, RISE Research Institutes of Sweden, and Luleå University of Technology leads EO data utilisation

Unlike Spain, Sweden has had to make do with a far smaller space budget and pool of private and public funds, however, it has managed to position itself as a key European player regardless. The Swedish National Space Agency (SNSA) presented its long-term strategy in 2019 following a concertation between the Ministry of Education and Research and the Parliament. The **Swedish space strategy highlights the need for a comprehensive approach to space activities**, considering societal benefits, industry competitiveness, advanced research, and foreign policy and security implications. Several goals were identified:

- A better use of space data to support the economy especially regarding Navigation and EO;
- Development of space technologies and programs for defence purposes;
- Improvement of the legal framework to secure investments;
- Increase the number of international space projects in which the country is involved;
- Ensure that Esrange spaceport remains an important European space centre by developing the Swedish Space Company.

In 2021, a commission submitted the Space Act Inquiry to the government to revise the space legal framework. The **new space law will encourage the development of R&D activities** while boosting the industry's competitiveness. In 2023, Sweden joined the NATO Alliance Persistent Surveillance from Space (APSS) alongside other allies. It contributes to NATO's data collection, boosting intelligence and surveillance capabilities for military missions. This collaboration involves establishing a virtual constellation named 'Aquila'. In April 2024, SNSA published an action plan for space activities, identifying five priority focus areas to implement the national space strategy up to 2030. It focuses on 1) strengthening national social security, 2) environment and climate, 3) research and training, 4) society's competitiveness, and 5) commercialisation.

Of greatest importance in relation to Portugal, however, is Sweden's Esrange spaceport. All launch and space operations require prior authorisation, with each application subject to consultation by the Armed Forces, Security Police, and the Inspectorate for Strategic Products to safeguard national security and compliance with export control. Operational safety is codified in the Esrange User's Handbook, which details requirements for flight termination systems, cryogenic handling, range safety, and mission planning. These protocols align national safety law with the specific operational environment of sounding rockets, balloons, and orbital launchers.

In parallel, licensing considerations extend to cross-border coordination, since launch trajectories may overfly Norwegian territory. Swedish and Norwegian regulators have established joint risk assessment procedures to address this. Finally, licensing is closely linked to state investment in Esrange's infrastructure: the Defence Materiel Administration (FMV) has committed approximately SEK 1 billion through 2032 to establish orbital launch capabilities, with infrastructure upgrades (e.g. Launch Complex 3) developed in tandem with regulatory readiness. This integrated approach ensures that **Sweden's legal framework, safety standards, and infrastructure development remain aligned as Esrange evolves into a European hub** for orbital small satellite launches.

Sweden's space ecosystem is underpinned by a strong academic and research base that reinforces its industrial and policy ambitions. **A milestone achievement was reached in 2024 when Marcus Wandt became the second Swedish astronaut to visit the International Space Station**, marking Sweden's visible return to human spaceflight and boosting national interest in STEM education. On

the academic side, the KTH Royal Institute of Technology has positioned itself as a leading centre for space research and technology through the KTH Space Centre, which brings together expertise in aerospace engineering, plasma physics, and space systems to support both ESA missions and industrial partnerships.

In addition, **Sweden has invested in data-driven innovation through the creation of the Swedish Space Data Lab in 2019**, a joint initiative between AI Sweden, the SNSA, RISE Research Institutes of Sweden, and Luleå University of Technology. The Lab acts as a national hub for the use of Earth Observation data, fostering applications in climate monitoring, forestry management, and artificial intelligence. This initiative reflects Sweden's broader commitment to connecting space science with societal benefits, ensuring that the country's research community not only supports technological progress but also addresses pressing environmental and economic challenges.

Best Practices

Using Esrange as a multiplier: facilitating licencing, access, and cooperation to boost space

A key best practice **Portugal could draw from Sweden's Esrange experience is the maintenance and promotion of its clear, permit-based licensing regime** that integrates safety, security, and international obligations. For the recently licenced Santa Maria Azores spaceport (Malbusca launch Centre), this means ensuring that all launch activities are, as is already required, licensed under the National Space Law framework, updated in 2024, with transparent procedures for operators and ongoing updates to prepare for the potential 2030 implementation of the EU Space Act.

Portugal could also emulate Sweden's approach to safety protocols and environmental standards. Esrange operations are governed by detailed handbooks covering flight termination systems, cryogenic handling, and risk management, all nested within Sweden's strong environmental legislation. For the Azores, which has unique ecological sensitivities and is close to populated islands and flight corridors, the **spaceport's licensing framework could similarly embed stringent environmental impact assessments, range safety rules, and emergency response mechanisms**. Integrating these requirements into the licensing process will not only ensure public acceptance but also enhance Portugal's credibility as a responsible spacefaring nation, as well as bring it closely in line with the expected requirements of the EU Space Act.

Finally, Sweden shows the importance of cross-border and regional coordination. Esrange regularly coordinates with Norway, since some launch trajectories pass over its territory. For Portugal, despite its full national jurisdiction of the FIR and maritime area in which the launches will happen, the **Azores' geographic position in the Atlantic means close engagement with European air traffic authorities, NATO partners, and transatlantic stakeholders** will be important for long-term evolution of the services and their embedding within the wider regional launch infrastructure. Embedding these coordination mechanisms into the licensing framework will both reduce operational risk and position the Azores spaceport as a trusted node in Europe's space infrastructure network, capable of serving institutional and commercial customers alike.

Space data application: creating a national lab for EO data applications

Sweden's experience with the Swedish Space Data Lab, launched in 2019 by AI Sweden, the SNSA, RISE, and Luleå University of Technology, demonstrates the value of establishing a dedicated national hub for space data utilisation. By pooling expertise across government, academia, and applied research institutes, the Lab has created a platform that accelerates the uptake of satellite data for societal benefit. Applications range from climate monitoring and forestry management to artificial intelligence services, ensuring that space investments are directly connected to pressing national challenges and economic opportunities.

For Portugal, a similar initiative could build on existing strengths in climate science, ocean monitoring, and Atlantic security. **A Portuguese Space Data Lab, coordinated a public body, a university-led consortium, or other entity could act as the focal point for integrating Copernicus and other EO data with national priorities**, fostering collaboration between startups, research groups, and public authorities. Strategically, situating such a hub in close connection with the Azores spaceport would allow Portugal to capitalise on its Atlantic location, making the islands not only a gateway for launch but also a data node for Europe. This dual role—hosting infrastructure and processing data—would reinforce Portugal's visibility in European space programmes, strengthen its contribution to climate and maritime monitoring, and create opportunities for data-driven innovation and skilled employment in the autonomous regions as well as on the mainland.

4.2.6. New Zealand

Context

Political

- New Zealand Space Agency (2016)
- Outer Space and High-altitude Activities Act (2017)
- National space policy (2023)
- Aotearoa New Zealand Aerospace strategy (2024 – 2030)

Key stakeholders

Zenno Astronautics, OPS, LEOLABS, DAWN AEROSPACE, Kea Aerospace

International collaboration

- U.S.-New Zealand Space Dialogue (2024)
- Artemis Accords (2021)
- WGS-9 satellite (2012)
- CSpO (2022)

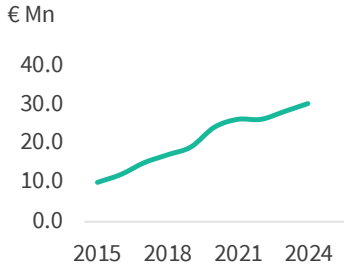
KPIs

€ 224 Bn
GDP 2024

€ 0.03 Bn
Space budget 2024

27
Space companies

Space budget



Tech & infrastructure

	Up	Mid	Down
Verticals		• Launch & space transportation • Reusable spaceplanes & propulsion • Space surveillance • Ground segment • EO and downstream	

Policies best practices

Access to public funding

- Funding availability is low, focussed on key projects
  - MethaneSAT
  - APSS-1
  - LeoLabs R&D projects
  - SouthPAN

Access to private funding

- Unusually high for a small country
- Dawn Aerospace: Raised millions in Venture Capital from national and international investors
- Kea Aerospace: Raised angel and seed funds

Regulatory

- Actively engaging with the US to reduce space trade hurdles
- Active collaboration with global allies to increase cooperation and expertise sharing

Academia & talent

- Focus on international commercial leaders such as Rocket Lab to attract talent
- Has a relatively small national pool but is highly attractive to foreign talents due to quality of life and salaries

New Zealand's space sector has grown totally outside the EU and European orbit, and yet its economic limitations and unique geographic position make it of great interest when considering possible paths for the future of the sector in Portugal. Set up in 2016, **the New Zealand Space Agency (NZSA) is the lead government agency for space policy**, regulation and sector development. Its establishment was largely **driven by commercial considerations, building on the success of New Zealand launch service provider Rocket Lab, founded and grown in New Zealand, before moving its headquarters to the USA in 2014**. A large part of the agency's actions has been in the legal field to establish a foundation for space activities. In 2017, the government passed the Outer Space and High-altitude Activities Act Following a 2022 review, the national space legal framework has been reported as performing well. In late 2022, the Ministry launched consultations to receive public feedback on the country's space policy. Based on this consultation, the country released in 2023 a new National Space Policy. As stated in the official document, the government will reflect and promote four values through the development of national space activities:

- Stewardship: **Preserve the space and Earth environments** for future generations
- Innovation: **Encourage responsible innovation**, science and technology
- Responsibility: **Advocate for a peaceful**, sustainable and **safe space environment**
- Partnership: **Engage** effectively within New Zealand and **internationally on space**

In the meantime, the country released in July 2023 the Aotearoa New Zealand Aerospace Strategy to support the growth of the country's aerospace sector. Following national elections, **the new government created the position of Minister for Space to promote space and advanced aviation in New Zealand** to further support the development of these sectors in the country. This position is part of the activities placed under the supervision of the Ministry of Business, Innovation and Employment (MBIE). Meanwhile, the country has strengthened its partnerships with spacefaring nations as shown by the U.S.-New Zealand Space Dialogue which occurred in 2024.

In 2024, New Zealand's space budget was estimated at NZ$51 million, a relatively stable evolution compared to last year's expenditures. At the civil level, the country invested NZ$30 million (US$19 million) in 2024. In recent years, spending primarily cantered on Earth observation (EO) for the development of MethaneSAT, which was launched in 2024. However, the nation's current budget priorities have shifted towards investments in Navigation, particularly to bolster the SouthPAN programme in partnership with Australia, as well as in the Launch field to support the development of local capacities. Additionally, the country has directed funds towards Technology, Science, and Exploration initiatives to enhance domestic capabilities.

At the defence level, the country invested NZ$21 million in 2024. Defence spending is influenced by the nation's involvement in the U.S. WGS programme for Telecommunications. Additionally, there are expectations for the procurement of EO data for both dual-use and defence objectives.[31]

In terms of funding, **New Zealand's space sector stands out for its vibrant private funding environment, anchored by venture capitalists with deep domain expertise**. One key example is

[31] Analysis from the 2024 Novaspace Market Intelligence reports

Outset Ventures, the Auckland-based deep-tech firm that spun out Rocket Lab and has recently closed its second fund at an oversubscribed NZ$ 41.5 million[32]. This capital efficiency supports the success of high-impact players like Rocket Lab, Dawn Aerospace, and Kea Aerospace, enabling them to scale globally despite New Zealand's modest public spending in the sector. The ecosystem also benefits from government-backed grants such as the MBIE's Catalyst: Strategic Space call, which in 2019 awarded six projects up to NZ$ 500,000 each to accelerate partnerships with international space organisations[33].

Alongside this, **New Zealand has actively pursued the facilitation of international partnerships by reducing regulatory and diplomatic hurdles to enhance its space partnerships with the United States**. In 2022, Wellington signed a Framework Agreement with the U.S., streamlining opportunities for collaboration with NASA and easing contract negotiations for missions like the CAPSTONE lunar launch from New Zealand territory[34]. This was complemented by the first-ever U.S.–New Zealand Space Dialogue in April 2024, aimed at bolstering cooperation across regulation, commercial space activities, and strategic planning[35]. Such agreements are particularly valuable for fostering international confidence and positioning New Zealand as a trusted, low-friction outpost for commercial and governmental space missions.

This international focus has not however mean that it has abandoned its national talent promotion and fomentation. **New Zealand's academic environment supports space science through multi-disciplinary centres and scholarships that connect students with world-class facilities**. Founded in 2019, Te Pūnaha Ātea – Space Institute at the University of Auckland promotes space mission execution and application development while disseminating knowledge to support the national sector[36]. Student talent is further nurtured through competitive programmes like the New Zealand Space Scholarships, which fund internships at NASA's JPL and Ames Research Centre; in mid-2025, seven students were selected for these prestigious opportunities[37]. Outreach efforts are also strong—with groups like UC Aerospace at the University of Canterbury leading STEM engagement in schools, while cultural institutions such as Space Place at Carter Observatory provide interactive astronomy education to the public.

Best Practices

Leveraging launch capability: using launch to attract business and international attention

A key best practice Portugal could take from New Zealand is the **leveraging of launch capability as a catalyst for national visibility and private investment**. New Zealand, despite limited public budgets for space, established a clear regulatory framework through the Outer Space and High-Altitude Activities Act (2017) and positioned itself as an agile, predictable environment for

[32] https://techcrunch.com/2025/05/27/rocket-lab-backer-outset-ventures-raises-25m-for-new-zealand-deep-tech-bets/?
[33] https://www.mbie.govt.nz/science-and-technology/space/space-related-opportunities-in-new-zealand?
[34] https://www.beehive.govt.nz/release/govt-signs-nz%E2%80%93usa-agreement-launching-new-opportunities-space-sector
[35] https://2021-2025.state.gov/joint-statement-on-the-u-s-new-zealand-space-dialogue/?safe=1
[36] https://www.auckland.ac.nz/en/engineering/our-research/engineering-research/research-areas-and-facilities/space-institute.html?
[37] https://www.beehive.govt.nz/release/space-scholarships-seven-university-students

commercial launch. This enabled Rocket Lab to scale from a startup into a globally recognised launch provider, attracting hundreds of millions of dollars in private capital and anchoring an ecosystem of suppliers and service companies before moving its headquarters to the USA in 2014. **Portugal**, as a small EU member state, could **use the Azores spaceport in a similar way**: not only as infrastructure, but as a strategic anchor for attracting international launch and downstream companies, showing that even a small country can occupy a niche within a larger regional ecosystem.

Streamline regulation: lower the barrier to entry for new players to promote innovation

Another lesson from New Zealand is the **creation of investment confidence through light but effective regulation and international openness**. Rather than trying to replicate the heavy budgets of larger space powers, New Zealand designed licensing processes that were clear, investor-friendly, and aligned with global safety norms, while retaining sovereignty over security and environmental oversight. This does not mean that the space law must be simplified or reduced, but rather that the processes it enshrines and enforces should be clearly explained and accessible via online portals with assistance provided when needed. In New Zealand, the resulting clarity unlocked private venture capital in spaceplanes (Dawn Aerospace), high-altitude platforms (Kea Aerospace), and space situational awareness (LeoLabs Kiwi Space Radar). Portugal, in its EU context, could replicate this by ensuring that licensing for launch and space operations is clear, and transparent, with easy to find and navigate portals for all applications and services, giving confidence to investors that Portugal is not only ESA/EU-compliant but also open to entrepreneurial risk-taking within the bounds of upcoming EU legislation. An example of this is a similar installation to that of the Kiwi Space Radar, having already been constructed in Santa Maria.

Build on international projects: target funding to boost existing international projects

Portugal could adapt New Zealand's practice of using international partnerships as multipliers of limited public spending. New Zealand secured bilateral agreements (with the US, ESA, and private foreign operators) that allowed its companies to plug into global supply chains and attract foreign investment. Portugal, within the EU, could achieve a similar effect by positioning itself as the Atlantic gateway for Europe's space ambitions, tying its spaceport and return hub, downstream services, and emerging startups to EU strategic programmes like IRIS^2, Copernicus, and GOVSATCOM, while encouraging private co-investment. This combination of a niche capability, light-touch regulation, and international integration could help Portugal stimulate private capital inflows and grow its sector beyond the scale its public budget would otherwise allow.

4.3. Summary of benchmarking

Following the analysis above, key takeaways have been identified at the present preliminary report.

Portugal's strengths:

- **Portugal has a strong supply of highly qualified aerospace engineers** with the trend continuing towards future growth in this sector as more universities are opening space-related courses and programs

- **Portugal has an established space law** that is well prepared to handle the expected increase in licencing requests but and is would be likely to require relatively little adjustment, if any, to align with the upcoming EU Space Act
- **Portugal has a growing launch capability**, as the Azores Space Consortium (ASC) has been granted a licence to operate the Santa Maria Spaceport, placing the country among the few in Europe able to offer orbital launch services.
- Portugal is currently the only European country positioned to **support return-to-Earth missions**, with ESA selecting Santa Maria as the landing site for Space Rider's maiden flight, affirming the Azores' role as Europe's hub for access to and return from space
- **Portugal has an active and engaged space agency** with deep sector knowledge and industry contacts that can support its growing ambitions at home and abroad

Portugal's pain points:

- **Portugal and its industry have struggled to access private funding** from national or international sources, while there is currently sufficient VC funding within the Portuguese market, these are not identifying enough viable candidates for their investments
- **Portugal has a limited national budget,** hampering its ability to significantly participate in international projects within ESA or provide large contracts to its industry to help stimulate its growth and evolution
- **Portugal has a lack of large established industrial players** to act as anchors and stimulate the SME ecosystem around them by acting as primes and coordinators in larger projects
- **Educated professionals often leave the country** due to insufficient job prospects, a lack of awareness of the available options, and wage differences between it and other space actors

Exhibit 40: Selection of key best practices for Portugal

Topic	Best practice	Origin country	Expected impacts for Portugal
Talent & promotion	Astronaut	Czech Republic	Increase visibility of PT in space, support STEM and research, create new collaboration opportunities for industry
Public/private funding & regulatory	National development targets	Greece	Give industry clear targets to aim for over mid to long-term, facilitating consolidation and tech maturation
Public funding	Long-term funding plans	Spain	Provide industry with the security needed to invest in long-term development and expansion
Regulatory	Cross-sector integration of space	Spain	Embed space in cross-sectoral strategies: linking talent development to ocean monitoring, climate services, and Atlantic security to broaden demand.
Regulatory & private funding	Promoting Azores' launch capacity	Sweden	Focus on barrier reduction increases attractiveness for new actors looking for viable launch options (opens new market segments)
Regulatory & private funding	Streamlining regulation and licencing processes	New Zealand	Increase the attractiveness of Portugal for new Start-ups, key to getting new unicorns based in Portugal

5. Results of economic analysis

This chapter discusses the main economic findings of the input-output model.

The chapter is structured into four sub-sections:

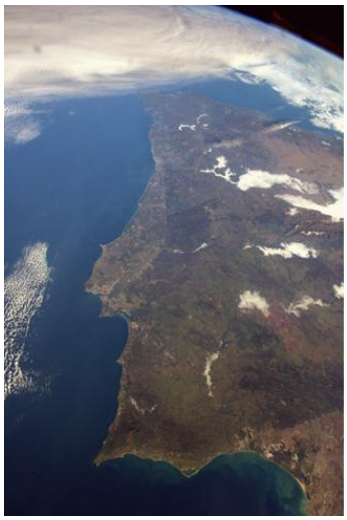
1. Outline of the **model's inputs** from which the effects on the national economy over the period of interest were derived. The rationale detailing the inputs to the model is covered in Section 2.2.
2. The **main findings** of the economic model, outlining the **impacts of the space sector on the national economy**, including output, GVA, employment and taxation.
3. Exploration of the detail of **the ripple effects on the economy**, segmenting the findings into direct, indirect and induced effects.
4. Finally, segmenting the various **findings across industries** impacted by space activities.

5.1. Recap of inputs to the model

As discussed in earlier, the analysis models both industrial revenues and institutional funding in space-related activities in Portugal since the establishment of the Portuguese Space Agency in 2019.

In total, **the model includes €1.1 billion in economic inputs related to space activities in Portugal from 2019 to 2024.** This is segmented as €736 million from industrial revenues, €313 million from funding to research institutions for civilian activities, and €8 million from additional military operations.

Exhibit 41: summary of model inputs

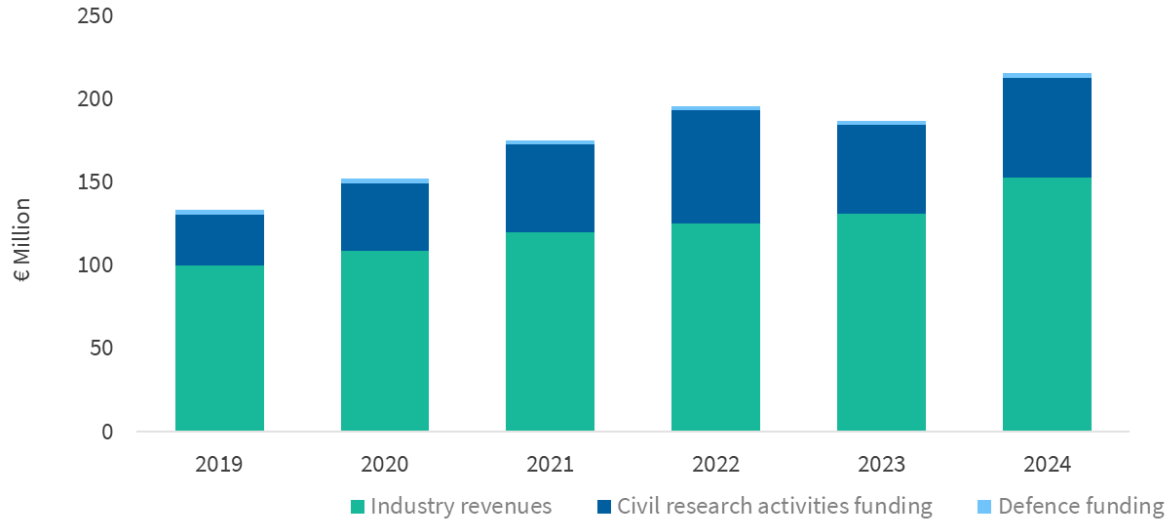


€736 Mn
Industrial Revenue (2019-2024)

€313 Mn
Institutional funding to research entities for civil activities (2019-2024)

€8 Mn
Institutional funding for defence activities (2019-2024)

Exhibit 42: Model inputs: industrial revenue and additional government final demand



Regarding industrial activity, **revenues from 96 commercial entities were modelled** producing space-related goods and services in Portugal over the analysis period. **These 96 entities generated a total of €736 million in revenue.** In parallel, the revenues generated by research institutions from civil and defence funding not accounted already in the figure for industrial revenue were modelled, as detailed in Section 2.2.1, **totalling €313 million (civil) and €8 million (defence).**

As outlined in the methodology, these inputs represent total Direct Output and therefore include intermediate consumption. While intermediate consumption is part of these entities' output, **it is not included in their contribution to national GDP** and is **subtracted by the model from the output to compute Gross Value Added**.

In 2023, a **noticeable decrease in modelled inputs can be identified**, driven mainly by two factors. First, there was a sharp reduction in allocations to the European Maritime Safety Agency (EMSA), headquartered in Portugal, which benefits from satellite data and EU-level cooperation. Portugal's participation in space-related projects through EMSA peaked in 2022, resulting in a halving of resources attributed to the country between 2022 and 2023. Second, another factor in the decline concerns Eutelsat, whose revenues in Portugal reached their highest levels in 2021–2022 before contracting thereafter.

Yearly **fluctuations are to be expected**, particularly in the context of a rapidly evolving post-pandemic economy characterised by periods of sharp contraction alongside significant injections of space-related funding through recovery and resilience schemes. These funds are expected to become more visible starting in 2025. Nevertheless, the overall trend points to sustained and steady growth in space activities throughout the period.

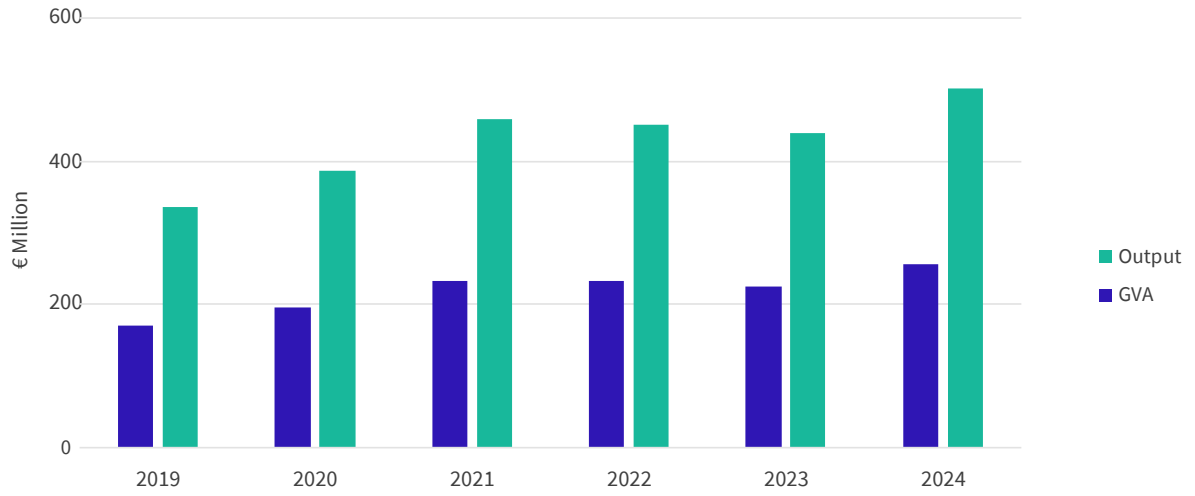
5.2. The space sector and the national economy

2019, economic production linked with the Space Sector has **generated a total economic output of €2.4 billion, a value added of €1.2 billion** and **supported approximately 4,447 jobs per year (total of 26,681 jobs)**.Between

The space industry has **enabled to earn €607 million in Labor Income** and generated a **tax revenue of €290 million to the Portuguese government**. These figures are cumulative, including direct, indirect and induced effects for the 2019-24 period and reported in 2025-euro year.

When zooming out and analysing the results on **an annual basis**, **output and contribution to national GDP figures closely track yearly revenues, indicating a steady increase in economic activity**. However, there was a slight dip in 2022 and 2023, reflecting the broader post-pandemic economic slowdown. The decline stemmed from two main factors: weaker revenues and investments in 2023, and sharp inflationary pressures in 2022. Annual inflation in Portugal peaked at 7.8% in 2022, amid high post-pandemic volatility. Since the model accounts for inflation and is based on USD values (later converted into euros), the simultaneous depreciation of the euro that year further amplified the effect. As a result, even though nominal spending increased in 2022, most of the rise merely offset higher prices.

Exhibit 43: Cumulative GVA and Output per year



Over the period of analysis, the model estimates that space activities contributed close to 0.1% to Portugal's total GDP. This estimate **does not capture the broader economic benefits generated by the use of space assets developed through these activities**. Even so, the relatively modest current footprint highlights the significant opportunity for Portugal to expand its space sector in line with the scale of its broader economy.

€2.4 Bn
Output

€1.2 Bn
Gross Value Added

~4.4 K
Jobs per year supported

€607 Mn
Labor income

€290 Mn
Tax revenues

2.17
Type II GVA Multiplier

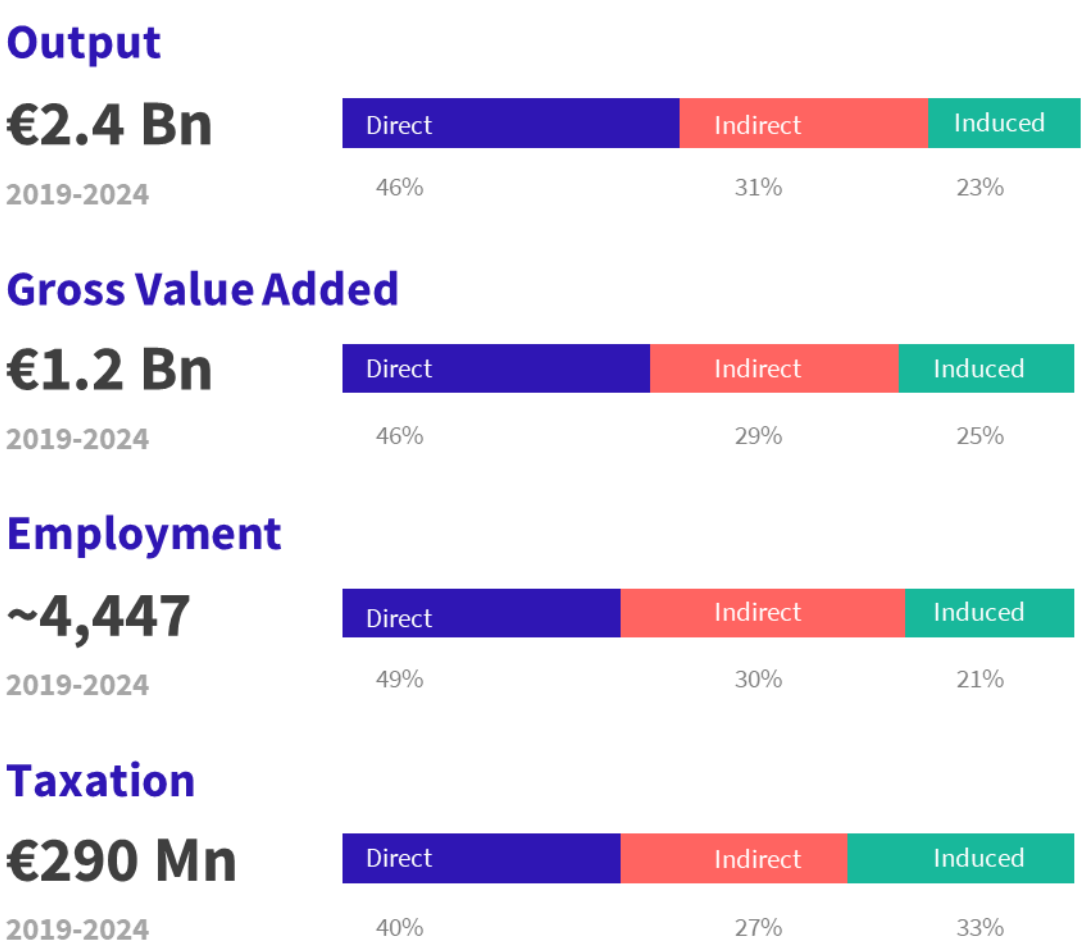
5.3. The ripple effects on the economy

During the analysis period, revenues and activities of more than 156 companies and institutions produced over €1.1 billion in direct economic output. In turn, this direct output **generated €559 million in direct GVA** (i.e., excluding intermediate consumption) and **supported ~2,162 direct jobs per year** (including full-time, part-time, and seasonal).

Furthermore, the production of space products and services has enabled €729 million in indirect output through the supply chain, adding **€350 million in indirect GVA** and creating another **~1,350 jobs per year**. Finally, wages earned by both direct and indirect employees circulated back into the national economy, generating an additional €548 million in induced output, **€305 million in induced GVA**, and **supporting approximately 935 jobs per year**.

Exhibit 44: Direct, indirect and induced effects

	Direct	Indirect	Induced	Total
Output	€1,101,551,369	€729,363,611	€547,659,031	**€2,378,574,011**
GVA	€558,513,755	€350,112,770	€305,062,002	**€1,213,688,527**
Employment per year	2,162	1,350	935	**4,447**
Taxation	€115,755,691	€77,458,391	€96,465,000	**€289,679,082**



To better understand the relation between direct, indirect and induced effects the study calculated:

- **Type I multipliers** considering only the purchases made by space actors within their supply chain
- **Type II multipliers** considering indirect and induced effects, including household spending. This is the more commonly used multiplier

The findings show that for each euro invested directly in space activities, **1.63 euros in total are supported through supply chain effects**, and **2.17 euros in total are supported more generally in the economy** (i.e., for every 1 euro in direct effects, 1.17 euros are supported in indirect and induced effects). Similarly, each job supported in the space sector reflects a total of **1.62 jobs supported in the supply chain**, and a total **2.06 jobs are supported in the overall economy**.

Exhibit 45: type I and II multipliers of GVA and Employment

	GVA	Employment
Type I	1.63	1.62
Type II	2.17	2.06

While methodologies for calculating economic benefits can diverge, the model suggests that Portugal's space sector's GVA type II multipliers sit between those of **countries such as the United Kingdom**, 2.35 in 2023, and **Canada**, 1.99 in 2021[38]. Additionally, during the ex-ante subscription impact analysis, ESA evaluated the estimated impact for Portugal as being 2.01 GVA Type I multiplier, and 3.04 for GVA Type II. This would suggest that proportionally, the ex-ante analysis foresaw a larger contribution to GVA in Portugal from indirect and induced effects compared to the assessment carried out within this report. In addition to potential differences in methodologies (i.e., differences between ex-ante and ex-post), there should be two factors to be borne in mind when comparing the results. First, European industrial players may subcontract Portuguese entities at low level of the supply chain (i.e., where it may not count as geo-return), which may result in higher indirect effects. Second, this study's model was focused solely on the Portuguese economy as opposed to the European model used by ESA, which may yield partially conservative results as it may lack a full appreciation of the leverage effects that participating European programmes have in boosting indirect and induced effects.

5.4. Economic effects across industries

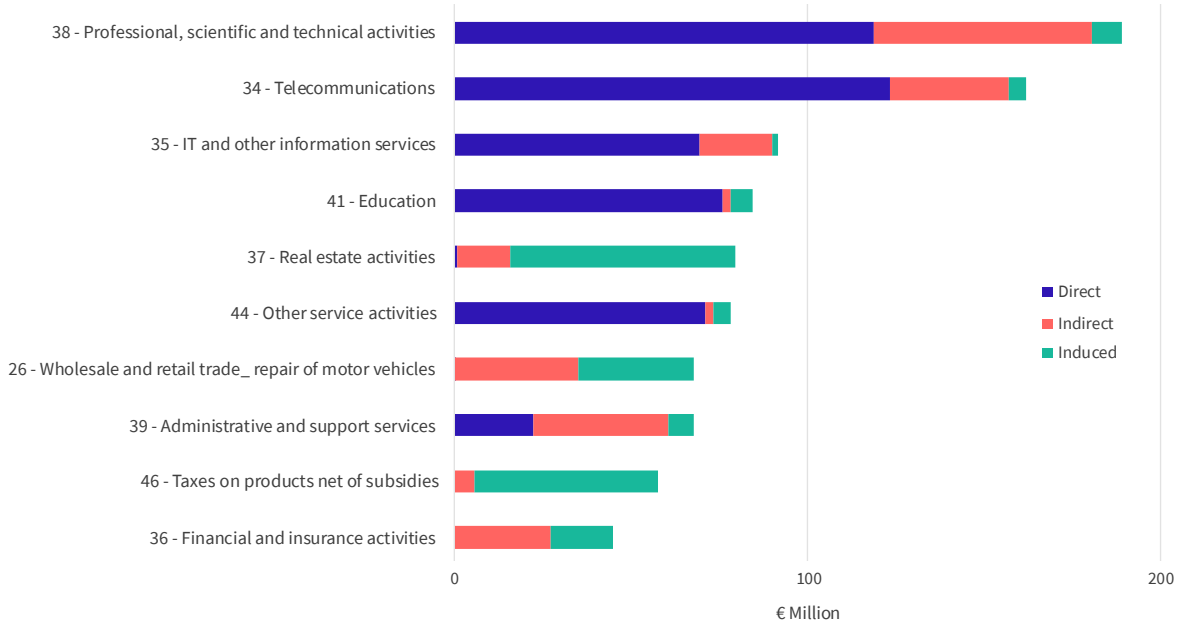
5.4.1. Output & GVA

Between 2019 and 2024, the largest share of total output generated by companies in the Portuguese space sector came from **telecommunications** activities, primarily driven by the local subsidiary of the French telecommunications company Eutelsat. Over the five-year period, total output from telecommunications reached €389 million. This was followed by **scientific and technical activities** with €368 million, and **IT and other information services** contributing €158 million.

[38] Source: Size and health of the UK space industry State of the Canadian Space sector 2020 & 2021

Similarly, the highest total GVA were recorded in **telecommunications** (34) and **scientific activities** (38) mirroring output. Industries significantly impacted by **indirect effects** include **electricity and gas supply** (23), **financial and insurance services** (36), **administrative and support services** (39), and **IT and information services** (35). **Induced effects** supported by space sector income were most evident in **real estate** (37), **wholesale and retail trade** (26), **accommodation and food services** (32), and **food production** (6).

Exhibit 46: Direct, indirect and induced GVA across 10 industries with highest GVA

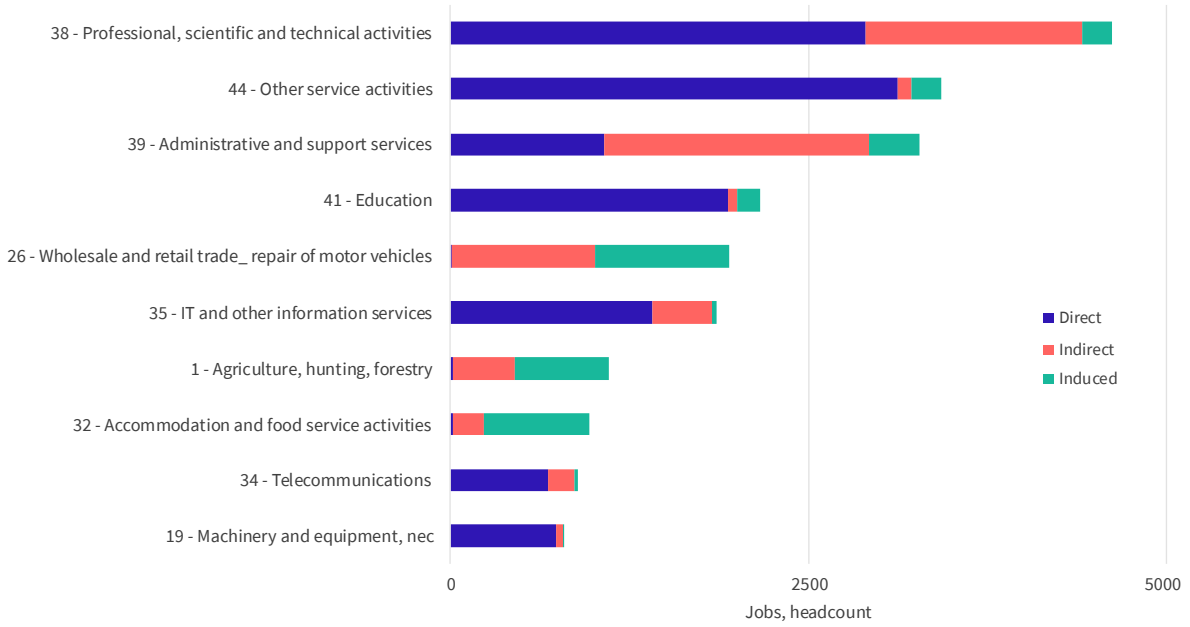


5.4.2. Employment

In terms of **employment,** the highest value was recorded in **scientific activities** (38), **administrative and support** (39) and **education** (41).

Industries significantly impacted by **indirect employment effects** include **administrative and support** (23), **agriculture** (1), **wholesale and retail trade** (26). **Induced effects** supported by space sector employment were most evident in **accommodation** (32), **agriculture** (1), **social work activities** (42).

Exhibit 47: Direct, indirect and induced employment across 10 industries with highest employment



5.4.3. Role of productivity across different industries

Exhibit 48: Indicators across all 46 industries (total direct + indirect + induced)

Code[39]	Industry description	Output	GVA	Employment
		In Million Euros		# of jobs
1	Agriculture, hunting, forestry	34	15	1106
2	Fishing and aquaculture	2	1	38
3	Mining and quarrying, energy producing products	0	0	0
4	Mining and quarrying, non-energy producing products	1	1	8
5	Mining support service activities	0	0	1
6	Food products, beverages and tobacco	51	12	276
7	Textiles, textile products, leather and footwear	22	8	337
8	Wood and products of wood and cork	59	18	499
9	Paper products and printing	15	4	69
10	Coke and refined petroleum products	15	1	4
11	Chemical and chemical products	13	3	34
12	Pharmaceuticals, medicinal chemical and botanical products	5	2	21
13	Rubber and plastics products	21	7	109
14	Other non-metallic mineral products	7	3	59
15	Basic metals	12	2	26
16	Fabricated metal products	25	9	281
17	Computer, electronic and optical equipment	8	1	30
18	Electrical equipment	6	2	44
19	Machinery and equipment, nec	97	34	788
20	Motor vehicles, trailers and semi-trailers	9	1	40
21	Other transport equipment	16	4	103

[39] Codes as reported in IMPLAN, the economic model provider for this study, based on OECD data.

Code[39]	Industry description	Output	GVA	Employment
		In Million Euros		# of jobs
22	Manufacturing nec; repair and installation of machinery and equipment	16	7	228
23	Electricity, gas, steam and air conditioning supply	70	19	38
24	Water supply; sewerage, waste management and remediation activities	19	8	157
25	Construction	27	10	333
26	Wholesale and retail trade; repair of motor vehicles	122	68	1949
27	Land transport and transport via pipelines	20	9	242
28	Water transport	1	0	5
29	Air transport	2	0	6
30	Warehousing and support activities for transportation	14	6	71
31	Postal and courier activities	8	3	104
32	Accommodation and food service activities	57	31	968
33	Publishing, audiovisual and broadcasting activities	24	11	183
34	Telecommunications	389	162	889
35	IT and other information services	158	92	1860
36	Financial and insurance activities	78	45	367
37	Real estate activities	94	79	128
38	Professional, scientific and technical activities	367	189	4615
39	Administrative and support services	107	68	3269
40	Public administration and defence; compulsory social security	41	31	640
41	Education	98	85	2159
42	Human health and social work activities	32	18	558
43	Arts, entertainment and recreation	20	9	297
44	Other service activities	136	78	3423
45	Activities of households as employers; undifferentiated goods- & services-producing activities of households for own use	4	4	321
46	Taxes on products net of subsidies	57	57	0

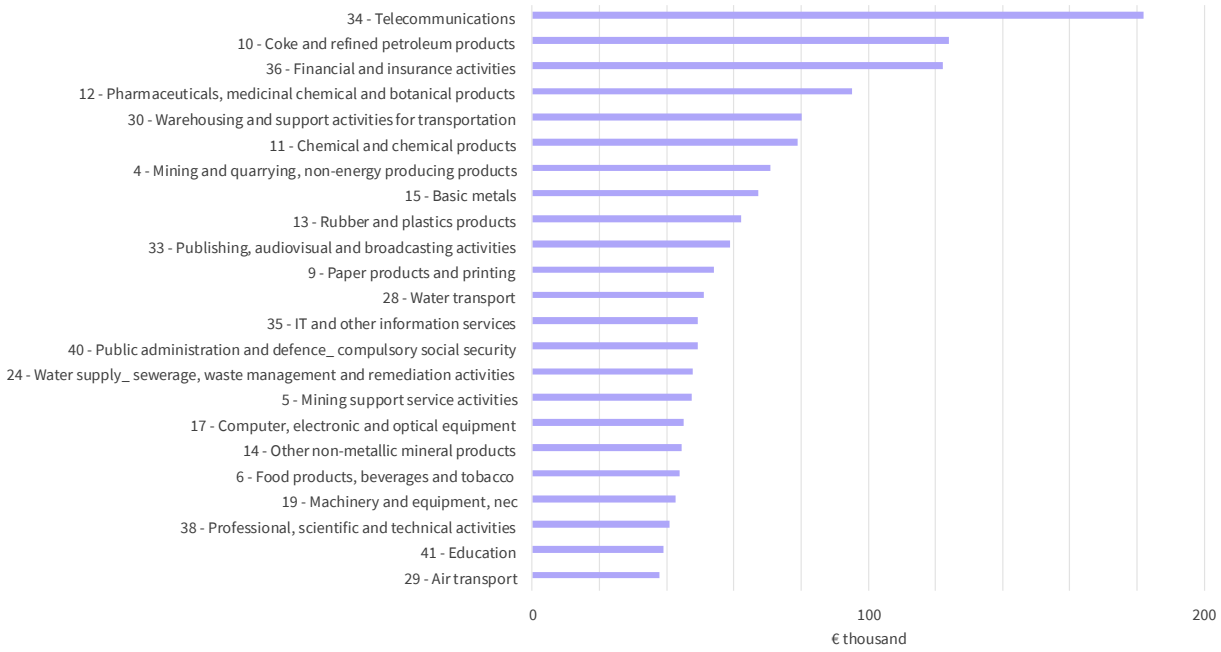
The difference in ranking between GVA and employment highlights **the role of productivity across industries.** Sectors such as telecommunications are highly productive, generating significant gross value added with relatively few workers. By contrast, industries like agriculture are much more labour-intensive, and while their contribution to GDP is more limited, they generate substantial employment, largely through induced effects.

In this context, the fact that **space activities are concentrated in efficient, high-productivity industries underlines their potential as a driver of wider economic growth**.

This trend is illustrated in the graph below, which shows **productivity levels across a sample of relevant industries in Portugal** over the period of analysis. The total GVA per worker was

calculated. As the figure shows, industries linked to space activities consistently display high productivity levels.

Exhibit 49: Sample of relevant industries by productivity in the model



5.5. Catalytic impacts

The analysis of the catalytic impacts, outlined above in section 2.5, is reliant primarily on the data collected from the surveys and interviews.

Number of SMEs/startups

The Portuguese space ecosystem is dominated by SMEs and Startups with only a few larger companies like Beyond Gravity standing out, with these being mainly international. A final detailed analyses of this is part of the final report.

Cost-savings/Efficiency gains

While there is considered to be a lot of potential, but it has not yet been realised as many potential users (public and private) are not aware of what is on offer. Interview respondents indicated that while their services might provide some cost-savings or efficiency gains to some end users, these were indeed non-quantifiable and not their primary objective. The general lack of focus on this impact in respondents' answers and work suggests that it is likely to be a minor part of the benefits offered by the space sector to Portugal and its industry at large.

Strengthen partnerships

Portuguese companies are engaging in partnerships primarily in Portugal and Europe (82% of respondents), but also beyond (55%), with the USA being host to many of the non-European partners. This engagement was further reflected in Interviews, with many key players reporting active collaborations with partners such as Axiom Space and other large US companies, as well as

many European players. This global interconnectedness is further reflected in the heavy reliance on international suppliers of Portuguese companies.

Exhibit 50: Respondent engagement rate with partners in Portugal and/or Europe

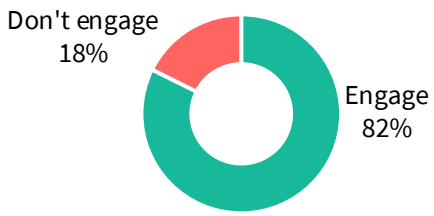


Exhibit 51: Respondent engagement rate with partners beyond Europe

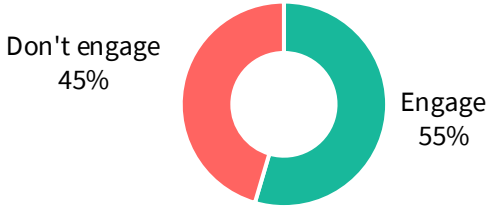
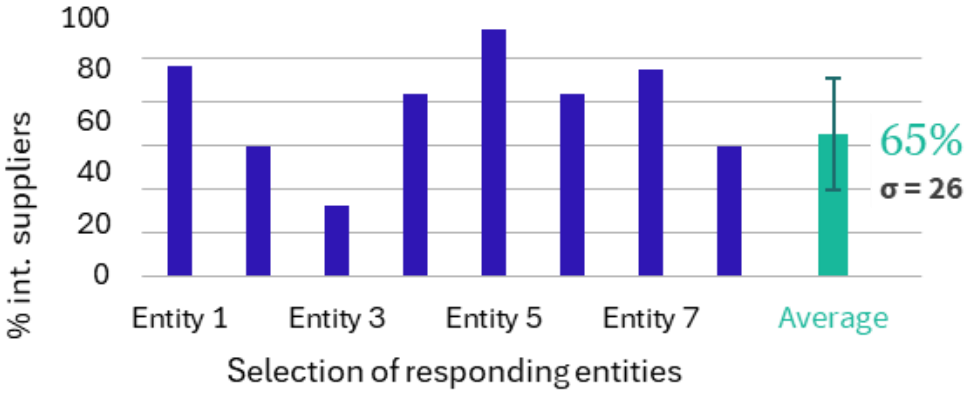


Exhibit 52: Respondent supply chain reliance on international suppliers



Competitiveness

From the surveys and interviews a number of key strengths and weaknesses in the Portuguese space ecosystem that impact its competitiveness were identified:

Strengths: availability of talent, low labour costs, launch availability, space for company growth, participation in ESA, support of the Portuguese Space Agency

Weaknesses: Lack of long-term funding, lack of large players to drive development, lack of governmental cross-sector cooperation, lack of sustained political support for long-term initiatives.

European autonomy

Interview suggest that Portugal is perceived as highly reliant on its allies for the provision of both hardware and data for the space sector and that Europe is not perceived as a leading market or power in space. Indeed, respondents generally felt that Europe was currently not very autonomous in the space sector, and that it was reliant primarily on allies such as the USA for key advancements.

However, there is a notably optimistic trend in respondent's perceptions of their contributions to European autonomy, with 52% of respondents claiming to have greatly or to some extent contributed to it already, but 94% saying they expect to do so over the coming five years due to ongoing product developments.

Global reputation

The space sector does appear to inspire a degree of national reputation, but respondents suggested that among the general public this is limited due a broad lack of awareness and understanding. That being said, 74% of respondents already believe that they contribute to Portugal's international reputation either greatly or to some extent, increasing to 95% when asked about the next five years. In both cases, the reasoning focussed primarily on the products and services offered, with a particular focus on eye catching developments such as launch capacity.

Access to new markets

Most respondents rated a score of 0-1 (no to low impact) but a notable minority did select 2-3. Also, it is worth noting that many of those choosing the lower scores indicated that they were also not yet aiming at new markets. Given these results, and discussions with various interviewees, it appears that Portugal is not particularly effective at granting its companies access to new markets, though there was a suggestion that it could increase this capacity through greater engagement with the rest of the lusophone nations in Africa and South America, to act as a bridge between European players and those in developing space countries.

> *Portugal has key connections beyond the EU, including Brazil and Angola*

First mover advantage

Very few entities felt that being based in Portugal provided a strong first mover advantage, but some did suggest that the growing availability of launch capacity could begin to support this over the coming years and emphasised the importance of ensuring the industry is given the tools to be able to jump on new opportunities as soon as they arise.

> *Portugal must prepare its industry to take advantage of the huge reduction in launch costs that is coming soon*

Capacity-building

Capacity building has been one of the main focusses of the Portuguese space sector thus far and it appears to have achieved some success as 45% of respondents felt that working within the sector had provided them with the opportunity to greatly or to some extent increase their technical expertise and capacity. Looking to the coming five years, this increases to 66% of respondents. It is also worth noting that some of those claiming limited or no capacity building are non-relevant companies such as venture capital firms or larger international companies who are not looking to expand further at present.

Spin-in potential

55% of the survey respondents currently believe that they have used products that were created for purposes outside of the space sector. This percentage remains the same when considering the future prospects, though with a slight shift towards the “Grealy impacted” compared to the present.

Spin-off potential

Most respondents rated a score of either 0 or 1 in these questions (no, to low impact). This remains constant for the present and the next five years, though with a slight shift towards more positive responses when looking to the future.

Educational institutions

The number and variety of educational institutions offering space related courses has been increasing rapidly over the last years as interest in them has grown with recent key examples including Evora, Porto and Minho. Indeed, this was highlighted by many respondents as a key part of the attractiveness of Portugal and a strength it should continue to build on by expanding the courses beyond aerospace.

> *Education should go beyond aerospace; the sector needs a wider variety of qualified people and also more experienced people*

Outreach Activities

Interview results suggest that there is a perception that more should be done aimed at the political class to increase long-term buy-in and investment, rather than increasing the focus on the public.

However, many respondents to both forms suggest that they are quite active in outreach via traditional media and in person with 66% of survey respondents saying they have already been greatly or somewhat involved in outreach activities for the public and 81% expecting to be over the coming five years. Indeed, multiple respondents viewed this activity as an obligation for all.

> *It is a duty of all companies to have a social outreach component to show how they create value for society and to attract new talent to the area and STEM more broadly*

Public awareness/inspiration

There are markedly mixed views on this with some feeling that their companies are doing a lot and enough is already happening, and others claiming that it is severely underfunded and much more is required from the state side via both traditional and new media forms.

> *Maybe they (Portuguese Space Agency) could be more present on social media with shorts, interviews, and highlights of ongoing research. Then more in-depth pieces on general TV*

Sustainable development

Sustainability is generally not perceived as a priority beyond the requirements imposed by licensing and regulation, this is evidenced by the 52% of survey respondents who do not feel they have had any, or very little, impact on sustainability work in Portugal, and only 11% who actually claim to have had a great impact in this area. Notably, when looking to the next five years, this proportion shifts significantly as 82% of survey respondents say they expect to contribute to sustainable development in Portugal. Many feel that the availability of national launch capacity can facilitate more work towards sustainable development goals.

> *All that today is something non-reusable, there is an interest in making it re-usable. So that is a huge place to invest in, as there are very few operators making and using re-usable space systems or sub-systems*

Improved quality of live

The nature of the Portuguese space ecosystem means that the only primary benefits to quality of life come from location services and EO data for purposes such as firefighting, few Portuguese companies are providing these and as such very few claim to be providing significant quality of life benefits for every-day Portuguese citizens. However, some did highlight the broader level impacts of their work.

> *We improve it for groups, not the generality, we provide information that institutes share with key vulnerable populations, we also make the platform for this and facilitate it*

5.6. Comparison space sector & other relevant sectors

For an effective and reliable comparison of the economic impact of the Portuguese space sector with other sectors of the Portuguese economy, it is crucial to identify sectors with similar characteristics. These characteristics range from the market structure and size, capital intensity, the maturity of that sector and others. Of course, **the perfect comparator does not exist**. Nevertheless, by observing how the space sector impacts the whole Portuguese economy in relation to other sectors trends and relative contributions can be observed, which highlight the sector's broader economic significance.

For an accurate comparison between two sectors, their macroeconomic impacts for the same period must be investigated, in the case of the analysis, the years 2019-2024. In doing so, the same factors which have an influence on both sectors, such as COVID19 are considered. Additionally, **the same analysis should be conducted for the comparator industry**, where using an I/O model the economic ripple effects of the selected sector on the Portuguese economy are measured. Due to limited availability of data, this comparison is not possible, and the analysis is focussed using the findings from other trustworthy studies.

Two sectors have been selected to provide a comparative analysis: the aviation sector and the health and life sciences sector. The aviation sector has been selected as it shares similar market characteristics with the space sector, including advanced engineering, high R&D investment, and cutting-edge innovation. Like the space sector, aviation is also concentrated in high-productivity, high-value-added industries, which further enhances its economic multiplier effects. Another reason for selecting aviation is its alignment with national and European strategic agendas. For instance, in the recent reprogramming of the Recovery and Resilience Plan (RRP), the aviation and

space agendas in Portugal have received the most significant funding increases, showcasing the importance of these sectors for the country's economy. Lastly, like space, the aviation sector is closely linked to sovereignty, security, and often involves government participation through funding, regulation, or strategic programmes. Nevertheless, **some concerns as to the different maturities and sizes of these two sectors** in the Portuguese economy were raised, which may be reflected in the differences in their macroeconomic impacts.

A 2023 study by Oxford Economics highlights the **significant contribution of the aviation sector to Portugal's economy** as seen in the table below. More precisely, in the year 2023, 51,000 people were directly employed in aviation, generating €4.26 billion in direct economic output. When considering the broader economic footprint including the supply chain, employee spending, and tourism-related activity, the sector contributed a total of €18.7 billion to GDP and supported 334,600 jobs. It is important to note that, since the study only has results for a single year for the aviation sector, the figures shown below, can only be comparable to the six-year findings for the space sector, once annual averages are calculated.

Exhibit 53: Aviation numbers for the year 2023

Macroeconomic variables	Values
Direct output	€4.26 billion
Direct employment	51,000
Total output	€18.7 billion
Total employment	334,600

Comparing the findings reported in the exhibit above with the annual averages of the space sector shows that the aviation sector contributes more to the Portuguese economy in terms of total output and employment. Several factors could help explain this. Firstly, **aviation is a mature and well-established sector with a longstanding market presence,** while the space sector in Portugal is still relatively young and developing. Moreover, the **nature of economic activity in each sector differs:** aviation delivers direct, consumer-facing services such as passenger transport, cargo, and airport operations that generate high-volume, recurring revenue. In contrast, space activities tend to be R&D-intensive, project-based, and more strategic in nature, often with longer-term or indirect economic benefits.

The **health and life sciences sector in Portugal was also selected for comparison with the space sector, as both are grounded in advanced research, cutting-edge technology, and innovation-driven growth**. Both rely heavily on complex value chains, and sustained R&D investment, often supported by national and European strategic programmes, such as the EU's Horizon Europe programme. Like space, the health and life sciences sector contributes significantly to Portugal's GDP while also producing technological and scientific spillovers that benefit the broader economy. Its strategic importance, particularly in the context of public health resilience and EU industrial policy, mirrors the geopolitical and sovereignty dimensions often associated with the space industry.

According to an AICEP (Portuguese Trade and Investment Agency) report, in 2023, the **health and life sciences sector in Portugal generated an estimated €8.4 billion in Gross Value Added (GVA)**

and supported approximately 260,000 direct jobs, highlighting its significant role in the national economy. The total economic output associated with the sector reached €27.1 billion as shown at exhibit below.

Exhibit 54: Health and life sciences sector numbers for the year 2023

Macroeconomic variables	Values
Direct GVA	€8.4 billion
Total employment	260,000
Total output	€27.1 billion

The most evident distinction between the two sectors of analysis lies in their relative scale. The health and life sciences sector benefits from a long-established industrial base, high levels of consumer demand, a mature ecosystem of firms, research institutions, and global supply chains. By contrast, the space sector in Portugal remains younger, more specialised, and less commercially diversified, though it is rapidly evolving. As an emerging sector, it is primarily driven by targeted R&D, public investment, and strategic programmes, rather than high-volume consumer services or mature market structures.

Given the strength and growth of Portugal's health and life sciences sector, there is a **valuable opportunity to create strategic synergies with the space sector**, particularly in emerging fields such as space health, pharmaceutical, biomanufacturing in orbit, and microgravity-based research. Activities such as pharmaceuticals manufacturing in orbit are posed to benefit greatly from return-to-Earth capabilities offered by Santa Maria, as well as those provided by the Space Technological Centre. Other specific areas of convergence include in-orbit protein folding and crystallisation, disease modelling, and the development of organoids in space. This **cross-sector integration could leverage the scale and impact of health and life sciences sector to boost Portugal's space sector,** by accelerating innovation and attracting investment; Portugal has the potential to position itself as a hub for space-enabled healthcare innovation with targeted policy support.

5.7. Comparing multipliers across industries

Another informative analysis would be to compare the different multipliers of some of the industries used in the analysis, ranking highly in terms of total GVA (sum of direct, indirect and induced GVAs). More specifically, the study focussed on type II GVA multiplier, which helps understand how total GVA reverberates through the wider economy via supply chain linkages and household spending.

Reminder that the formula for calculating type II GVA multiplier is the following:

$$\frac{Direct\ GVA\ +\ Indirect\ GVA\ +\ Induced\ GVA}{Direct\ GVA}$$

As shown below, for each euro invested directly in space activities, 2.17 euros in total are supported in the overall economy (including the initial investment of 1 euro, i.e., 1 euro in direct GVA plus 1.17 euros in Indirect & Induced GVA). The **construction industry recorded one of the highest type II GVA multipliers** among the 46 disaggregated industries used in the model, whereas the wholesale and retail trade one of the smallest. This demonstrates that a **high total GVA contribution does not necessarily correspond to a high type II GVA multiplier**, as the multiplier reflects not only direct

value added, but also the extent of indirect and induced effects generated through inter-industry linkages and household consumption.

Exhibit 55: Type II GVA multiplier across selected industries

Industry name	Type II GVA multiplier
Wholesale and Retail Trade	1.96
Agriculture, Hunting, Forestry	2.01
Space	**2.17**
Professional, Scientific & Technical activities	2.30
Telecommunications	2.37
Construction	2.80

Although the space sector in Portugal is relatively young, its type II GVA multiplier of 2.17 highlights the significant indirect and induced effects it already generates across the economy. This suggests that **the space sector is well-connected to the broader economic fabric through its supply chains and the incomes it supports.** Continued investment in the space sector could therefore enhance its contribution to national economic growth, as these ripple effects expand alongside the sector itself. Therefore, any kind of investments that would boost the growth of the space sector, such as the cross-sector integration with the health and life sciences sector mentioned above will be very beneficial for the entire Portuguese economy.

6. Future strategic analysis

After assessing the Portuguese space sector, its socioeconomic impact, and international benchmarks, the team identified key insights to inform **future strategic actions that complement and strengthen the current national strategy,** presented in this chapter. This chapter is structured into three parts as illustrated in the exhibit below.

Exhibit 56: Future strategic analysis chapter structure

6.1. Strategic vision & mission

Portugal has established a clear strategic vision for the development of its space sector. Building on its Atlantic identity and strong maritime heritage, the national strategy set out in 2018–2019 articulated a clear vision: to **position Portugal as a global authority in the science and economics of Space–Earth–Climate–Oceans interactions**, generating benefits for society. This vision was supported by a set of strategic objectives, ranging from fostering economic growth and jobs through the exploitation of space data, to advancing international cooperation and establishing legal, financial, and cultural frameworks that can stimulate sectoral development.

To deliver on this vision, the strategy defined key implementation axes: the promotion of space-based services and applications, the development of new technologies and infrastructures for data generation, and the strengthening of national capacity and skills through scientific research, innovation, and education. Together, **these axes aim to create a sustainable ecosystem** that both nurtures domestic talent and integrates Portugal more deeply into international value chains.

Within this final chapter, the study seeks to **incorporate further opportunities and strategic directions to the already established Portuguese Space Strategy**, updating it subtly to reflect the evolutions which have undergone both the space sector and the international geopolitical context between 2019 and 2024. As such, as a first step to the future strategic analysis, the study team has

defined a mission statement and strategic pillars, derived from Portugal's existing vision for its space sector, which helps guide the identification and concretisation of key future priorities and opportunities.

Exhibit 57: Updated strategic vision & mission statements

Vision	*Position Portugal – as an Atlantic nation, with a rich & global maritime tradition – **as a worldwide authority in the science & economics of Space-Earth-Climate-Oceans interactions** for the benefit of society and economy*
Mission	*Harness **space applications** and **cutting-edge technologies** to develop solutions at the intersection of Space & Earth. By fostering **entrepreneurship**, nurturing world-class **talent**, and building strong **global collaborations**, Portugal will create a thriving ecosystem delivering societal and economic value*

Looking ahead, future strategic opportunities lie in **maximising impact of space sector funding** by focusing on Portuguese clusters of excellence, as well as strengthening participation in European programmes, and expanding international partnerships. Furthermore, strategic opportunities can also be identified outside of domains which have already been identified as key priorities in the implementation phases of the existing strategies.

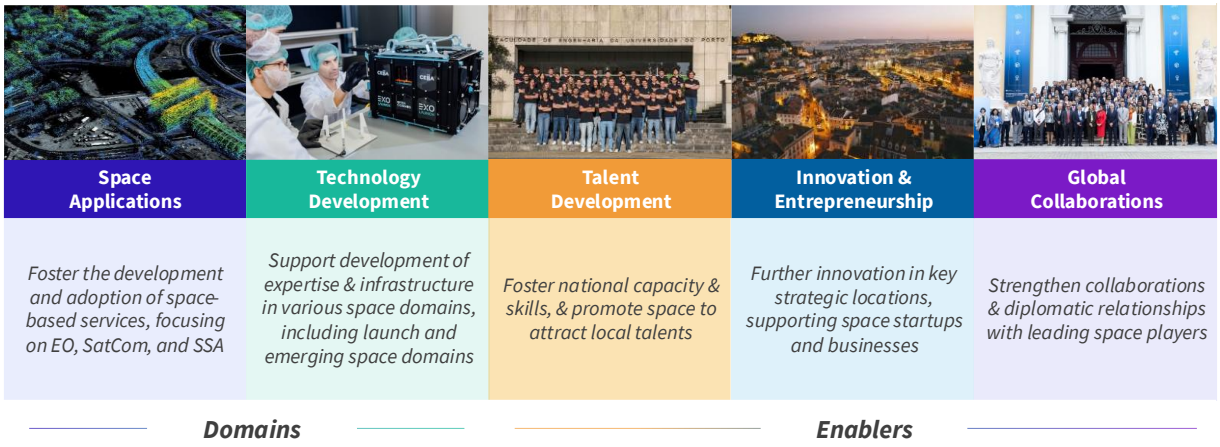
For instance, emerging domains such as in-orbit servicing, active debris removal, and more generally in-space transportation and logistics will necessitate advanced space situational awareness capabilities and are therefore a potential area of interest for different Portuguese space actors. Similarly, in-space manufacturing, and more specifically medical research into on-orbit pharmaceutical manufacturing, may also provide an interesting avenue for different Portuguese entities to venture into and contribute to the development of the sector.

Alongside all of the above, an increased incorporation of the defence and security aspects of space both separately, and as a sub-set of all other domains, will also be vital, as it is an ever more vital part of the space sector, as well as a growing source of both public and private investment for the sector. By ensuring Portugal's efforts are well aligned with national and regional security priorities, it can ensure that it maintains and grows its presence in this increasingly central pillar of space developments.

6.2. Strategic pillars

At high level, current and future strategic priorities for Portugal can be encapsulated into five strategic pillars, touching upon various domain-specific and enabling aspects of a fertile and diverse local space ecosystem, and visualised in the exhibit below.

Exhibit 58: Strategic pillars



Space applications are central to harnessing the full potential of satellite technologies and services, supporting users in a wide variety of industries to access key information. They represent a key strategic pillar for Portugal, underpinning the country's ability to translate space capabilities into tangible economic and societal value.

Advancing the development and adoption of space-based solutions in priority areas such as Earth Observation, Satellite Communications, and Space Surveillance and Tracking will allow Portugal to tackle pressing societal challenges at both national and European levels, while strengthening its competitiveness and visibility within the European and global space ecosystem. In particular, these applications enable improved environmental monitoring, enhanced disaster management, secure communications, and safer space operations, ensuring that space-derived data and services directly contribute to economic growth, security, and sustainability. In addition to applications in these three domains of focus, detailed in the following section, activities in support of satellite navigation systems such as value-added service development may offer interesting opportunities for Portuguese industrial players; Portugal could look to augment its investments in programmes such as ESA NAVISP in order to bolster its positioning at European level, and follow-up on Portuguese innovation initiatives in sectors like maritime logistics and autonomous drones.

Technology development is essential for a sustainable and competitive space sector. Key areas such as small satellite platforms, Earth Observation and communication payloads, advanced materials, on-board software, and life sciences research represent strategic opportunities for Portugal to evolve from a contributor to an active innovator within European and global value chains. Strengthening national research, innovation, and engineering capacity is key for enhancing technological self-reliance and contribute to the development of dual-use capabilities that serve both civilian and defence objectives.

A strong focus on emerging fields such as artificial intelligence, quantum technologies, microgravity research, and automation further expand Portugal's technological base and generate spillover effects while reinforcing strategic resilience. Sustained investment is essential to ensure that research and innovation translate into market-ready solutions, generating industrial competitiveness and long-term impact. Close collaboration between academia, research centres, and industry foster technology transfer and accelerating innovation across the space ecosystem.

Talent development is a strategic asset. While Portugal already produces a steady pipeline of highly skilled graduates in key space-related disciplines, the next strategic step lies in retaining national talent, attracting experienced professionals, and fostering multidisciplinary expertise. Talent initiatives must include adjacent fields as data science, materials engineering, and biotechnology to further strengthen the national skills base.

Continuous learning, professional mobility, and exposure to international networks cultivate a resilient and future-ready workforce. Additionally, a close alignment between education, research, and industry is essential to ensure that skills evolve in step with technological advances and emerging national needs.

Innovation and entrepreneurship are on full display in Portugal's space startups and emerging companies reflects strong potential for innovation across the value chain. However, to transform this potential into global competitiveness, startups and SMEs must be supported in reaching commercial maturity and scale. Access to investment, strong incubation ecosystems, and participation in National, European and international programmes are critical. Encouraging innovation with dual-use potential can also open new markets and strengthen national capabilities.

Targeted innovation hubs and incubators, located in strategic regions, may continue to serve as catalysts for this transition, connecting entrepreneurs with investors, industrial partners, and research infrastructure. A supportive ecosystem also requires a regulatory and institutional framework that promotes experimentation and risk-taking while ensuring safety. Encouraging open innovation and cross-sector collaboration further positions Portugal as a hub for space-driven entrepreneurship in Europe.

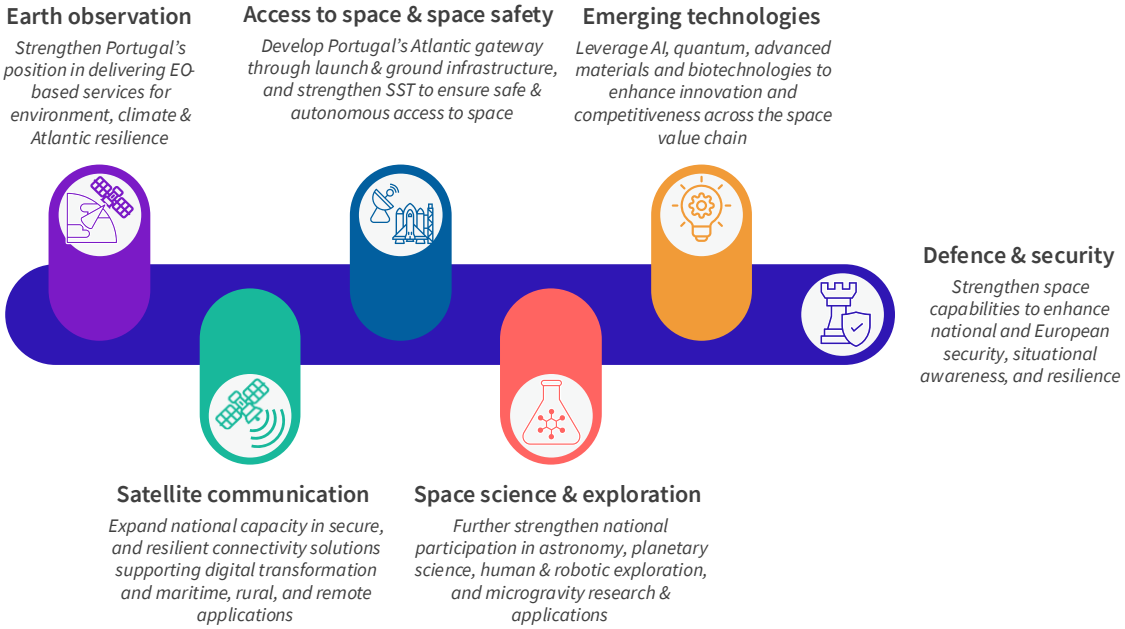
Global collaborations are a cornerstone of Portugal's space strategy and a key driver of its growing presence on the global stage. Portugal can amplify its scientific, industrial, and diplomatic presence in space by deepening engagement with European programmes such as ESA and the EU Space Programme and fostering bilateral partnerships beyond Europe. These collaborations enable access to, e.g., advanced technologies, new markets, and shared infrastructures, while reinforcing the country's visibility and credibility within the global space market.

Beyond institutional cooperation, building diplomatic and industrial bridges with leading space players is essential to expand opportunities for Portuguese companies and research institutions. Strategic cooperation in domains such as Earth Observation, launch services, and space sustainability can accelerate the commercialisation of Portuguese technologies.

6.3. Domains of focus

The first two strategic pillars are reinforced by a set of application & technological domains that align with Portugal's existing capabilities, national priorities, and European ambitions. The six domains of focus, highlighted in the exhibit below, define **areas where the country can achieve high impact**, generate scientific, economic, and societal value while reinforcing its role within the European & global space ecosystem.

Exhibit 59: Domains of focus



6.3.1. Earth Observation

Portugal has established a **solid and growing EO ecosystem**. The country now hosts an expanding industrial base with capabilities spanning satellite manufacturing, mission operations, data processing, and downstream service development. Initiatives such as the New Space Portugal Agenda, which includes the development of EO assets, demonstrate national ambition to build autonomous EO infrastructure. Alongside this, a strong network of companies and research organisations is actively leveraging Copernicus data to provide innovative services for sectors such as maritime surveillance, agriculture, forestry, and climate resilience.

This focus is well aligned with national priorities as highlighted in the Portugal Space 2030 Strategy. Additionally, it is consistent with key European policies and strategies, e.g., EU Green Deal, Industrial Compass, EU Space Strategy for Security and Defence, and the Digital Europe Programme, all of which recognise space and Earth Observation as enablers of sustainability, autonomy, and digital transformation. Portugal's continued commitment to EO as a strategic domain is therefore essential for **industrial competitiveness, technological sovereignty & environmental stewardship**.

Portugal is already a **committed investor in ESA's EO programme and Copernicus programme**, which has generated tangible returns for the domestic space industry, enabling participation in flagship missions and international partnerships. This involvement not only stimulates innovation but also secures access to and participation in European supply chains. Initiatives such as ESA BIC Portugal, ESA Technology Transfer Brokers and ESA Business Applications Ambassadors further strengthen the ecosystem by fostering entrepreneurship and innovation.

It is therefore essential that Portugal **maintain strong participation in these key European programmes**, both for strategic alignment and access to technical, financial, and collaborative opportunities. Continued engagement in these programmes strengthens Portugal's role in the

European EO ecosystem while ensuring that national support mechanisms remain stable and aligned with European initiatives, sustaining the growth of the national EO community.

National public investment instruments such as the PRR (Recovery and Resilience Plan) are demonstrating effectiveness in supporting national EO capacities and supporting the development of both upstream and downstream solutions. Such mechanisms could benefit from **additional technical oversight and mentorship** from, e.g., Portuguese Space Agency and ESA experts **to enhance the maturity and commercial readiness** of funded projects. This can be done, for example, via Technical Review Panels similar to ESA's TRP model, which convene independent experts to assess project milestones, risks, and provide feedback.

Portugal should also **foster international industrial partnerships** to accelerate technology transfer, enhance innovation capacity, and secure market access. Cooperation with Iberian and European EO manufacturers has already shown success through initiatives such as the Atlantic Constellation. This constellation has become ever more important in the current geopolitical situation with its heavy emphasis on European data and informational sovereignty, and promises to continue to become ever more central as global and regional tensions show no signs of easing soon.

Building on this momentum, the Portuguese Space Agency can facilitate industrial cooperation, for example, by promoting joint participation in ESA and Horizon Europe calls, supporting consortium formation, and encouraging co-development of technologies with international partners. More specifically, **Portugal should pursue a central role in upcoming EO focussed ESA ERS programme** which is aiming to bring together a "coalition of the willing" via clusters of ESA member states.[40] Portugal's role in the Atlantic Constellation means it is well prepared to actively engage in this initiative from day one, and thereby position its industry to capitalise potential upcoming EU Governmental Service programmes.

Moreover, Portugal could leverage its historic and linguistic ties to **extend EO services and partnerships beyond Europe**, particularly with Lusophone countries in the CPLC (Community of Portuguese Language Countries) such as Brazil, Angola, and Mozambique. Portuguese EO capabilities can address shared priorities as deforestation monitoring, climate resilience, disaster management, precision agriculture, and resource management. Building on the existing MoU with Angola, Portugal could establish additional agreements with Lusophone governments to develop joint EO programmes & data-sharing initiatives.

Additionally, the Portuguese Space Agency can support the adoption of national companies' EO services in these countries by facilitating pilot projects with local authorities and organising trade missions. The latter aims to build partnerships, explore new opportunities, and promote knowledge exchange. One example is the Dutch mission to Indonesia and Malaysia on EO applications for agri-food and water management.

Downstream applications represent one of the fastest-growing segments of the global space economy and should remain a strategic priority for Portugal. The country already has comparative strengths in maritime and coastal monitoring, which may continue to be a primary focus area to meet national and European demand. However, a key challenge remains the limited adoption of EO

[40] https://spacenews.com/esa-moving-ahead-with-resilience-from-space-satellite-imaging-program/

services by public and private end users. To address this, Portugal could **invest in pilot projects co-designed with users** (similar to the EO for municipalities initiative with ESA) and ensure the continuity of demand through recurring service contracts and integration within public sector.

To further enhance Portugal's strategic opportunities in EO, it is essential to **increase continuous training and awareness among public administration stakeholders**, ensuring they develop trust in EO data, understand its potential and adopt it in decision-making. Complementing this, the bi-annual national EO conference Terra em Foco (first held in 2022) has become a key forum bringing together industry, academia and end-users, showcasing services, applications and funding opportunities, and strengthening the ecosystem.

Increasing the user uptake of EO services and products should be targeted as a key priority, as it can amplify downstream benefits for society and stimulate economic activity. In particular, educating users through industrial workshops and supporting the integration of EO services into company and public institution operations, e.g., through pilot projects, can unlock substantial efficiencies and serve as powerful examples for broader adoption.

Another strategic priority for Portugal is the **development of artificial intelligence and cloud-based processing capabilities associated with EO services**. As the volume of Copernicus, national EO data, and commercial data continues to grow exponentially, the ability to process, analyse, and extract insights from this data becomes a critical enabler of value creation. To achieve this, one key action could be to expand national analytics skills and data science capacity across academia and industry. Beyond data-focused university courses, targeted PhD and internship programmes linked to ESA initiatives and other international partnerships can play a central role in developing the next generation of EO data specialists. For instance, the **ongoing FCT-supported internships already contribute to training** young professionals.

Finally, **leveraging private investment is crucial to ensure the sustainable growth** of Portugal's EO sector. This can be achieved by offering co-funding schemes that help reduce early-stage risk. Also, training and mentorship programmes can create a stamp of the space agency. Training and mentorship programmes, endorsed by the national space agency, can provide a mark of credibility that draws private investors. Strong institutional backing signals that ventures meet high technical and strategic standards, helping to attract venture capital and corporate investment and accelerating the commercialisation of innovative EO technologies and services.

6.3.2. Satellite communications

Satellite communications is a core pillar of Portugal's space strategy, targeting the provision of commercial **SatCom services to end users**, **ensuring national resilience, secure and independent connectivity, and driving innovation across sectors**. Leveraging its Atlantic geography and established ground infrastructure, Portugal is well positioned to support critical services such as defence, emergency response, maritime safety, and rural broadband while integrating into European programmes like IRIS^2 and GOVSATCOM. With a growing engineering base in ground segment and secure network, the strategic objective is twofold: to guarantee sovereign connectivity for public services, and to foster exportable, market-ready solutions in mobility (e.g., maritime), IoT, and data backhaul.

Focusing on satellite communication technologies aligns Portugal with both national and European strategic priorities by **advancing digital sovereignty and secure connectivity**. It supports national goals of technological innovation, while contributing to EU flagship initiatives. This focus is also in line with the EU Space Strategy for Security and Defence and the Digital Decade objectives.

One key strategic action is for Portugal to deepen its role in sovereign and secure satellite connectivity by **strengthening its engagement with EU initiatives** such as IRIS² and GOVSATCOM, enabling industry to participate in wider SatCom supply chains. Portugal should look to build upon its growing international footprint, and further support dual-use satellite communication and secure communication projects explicitly aimed at the development of continent-wide constellations such as IRIS².[41] For GOVSATCOM, Portugal should build on its past engagement via the Portuguese Space Agency in the ENTRUSTED project to continue developing solutions for the user needs identified (e.g., via follow-up activities in the scope of GOVSATCOM SPC) and position itself at the forefront of solution provision in this domain.

A priority niche lies in maritime and island connectivity, where Portugal's dispersed geography and strong ocean-based economy create a natural demand for satellite-enabled services supporting ports, fisheries, offshore energy, and environmental monitoring. The New Space Portugal Agenda VDES constellation offers a concrete opportunity to enhance maritime data exchange and connectivity across the Atlantic, supporting both safety and commercial operations. **Promoting demonstrator projects, alongside targeted awareness initiatives in these sectors**, can stimulate demand and incentivise Portuguese technology firms to develop tailored connectivity solutions.

The defence dimension of satellite communications is crucial for Portugal, as secure and resilient connectivity underpins both national security and civilian operations. Portugal should therefore **promote the development of dual-use technologies** that serve both defence and commercial needs. This can be achieved by expanding participation in ESA's ARTES programme, creating national co-funding schemes for dual-use SatCom innovation, and incentivising partnerships between defence stakeholders, industry, and research institutions. Additionally, challenge-based public procurement (e.g., civil protection and coastal security) could support creation of demand for dual use SatCom technologies.

Satellite communications technologies, like the ground segment sector, require **robust cybersecurity measures to ensure the resilience and trustworthiness** of national infrastructure. Regulations should align with the forthcoming EU Space Act and related EU cybersecurity frameworks, while Portugal should actively develop and enforce cybersecurity standards across its SatCom ecosystem. In addition to supporting R&D projects focused on key areas as encryption, network resilience, and quantum communication via national or international funding sources, establishing certification and compliance schemes is equally important to ensure that national operators and service providers meet the highest levels of security and interoperability with European systems.

[41] https://ptspace.pt/portuguese-space-agency-strengthens-the-sector-with-40-million-in-support-for-dual-use-projects/

Building on its industrial and research capabilities in SatCom terminals and antennas, Portugal can expand into **advanced terminals and optical communication technologies to support secure, high-speed connectivity.** Concrete actions include establishing national R&D calls for laser-based ground-to-satellite links and on-the-move terminals, and creating demonstrator installations in the Azores and mainland sites to test and validate these technologies in real operational environments.

6.3.3. Access to space and space safety

Portugal's emerging role in access to space and return activities represents **one of its most significant strategic opportunities** for the coming decade. With the ongoing development of a licensed spaceport in Santa Maria, Azores, Portugal is positioning itself as a gateway for European access to space, particularly for small satellite launches. This effort builds on a robust legal and regulatory framework already in place to govern national space activities. In parallel, Portugal's growing network of ground stations and infrastructure supports both international programmes (such as ESA's missions) and domestic operations, including examples like Neuraspace's telescopes and the ANACOM license for EOSSAT-1 operations, demonstrating an increasing national capacity.

Portugal's **geographical location offers a unique advantage** for access to space, return-to-Earth and ground segment operations. Its position in the Atlantic provides optimal orbital access, low population density for safe launch trajectories, and proximity to key transatlantic communication routes. The Santa Maria spaceport and advanced teleport capabilities will allow Portugal to play a key role in European, and global, return/re-entry activities. Furthermore, the spaceport's prime location and expected capabilities will further boost the development of the Centro Tecnológico Espacial de Santa Maria, by attracting companies, willing to invest in the region. In line with national priorities, such as the "Atlantic as a Platform" vision under the Portugal Space 2030 Strategy, the country is positioning itself as a fully European doorway to space and return hub for orbital activities. Not only does this position Portugal as a key contributor to the furthering of European space sector competitiveness and strategic autonomy in line with European Union goals as outlined in the EU Space Strategy for Security and Defence, but it also allows Portugal to compete globally for hosting commercial exploitation of spaceport facilities.

A key short-term priority is to **complete and operationalise the Santa Maria Spaceport**, which recently obtained its licence to operate, via the ASC. For this, it is notable that Portugal has already completed the infrastructure and safety validation processes, ensuring that launch operations can be conducted under international best practices for environmental and risk management, ensuring dialogue between key entities such as regional authorities, ANACOM and ASC. All that remains now is the licencing of the individual launchers once the operators are ready, as well as promoting the critical role of the space technological centre which is foreseen to support the integration activities of the payloads and launchers.

Another important dimension of the Santa Maria Spaceport lies in the opportunities and economic benefits associated with suborbital launch capabilities. Suborbital launches, which reach space without entering orbit, are expected to represent a key activity in the near term, serving as an intermediate step toward achieving full orbital launch capability. These suborbital launches will also help meet the growing demand for microgravity experiments, supporting fields such as

pharmaceutical research and education activities. In turn, this will further attract new companies in the area, further strengthening Portugal's position as an emerging space hub in Europe.

The re-entry capabilities offered by Santa Maria, positioned as a **key hub for return-to-Earth mission, will ensure Portugal's position in the growing LEO economy**, supporting diverse commercial, governmental, and academic activities and opportunities. Notably, ESA's upcoming Space Rider mission (Europe's first reusable end-to-end system for launch, in-orbit operations and precision landing) will conduct its maiden flight on Santa Maria Island, which currently serves as Europe's only designated return and recovery site. In parallel, activities investigating the opportunities to leverage the microgravity environment offered by (future commercial) space stations in pharmaceutical research, development, and manufacturing is expected to become a growing focus of the sector. By offering a reliable hub for re-entry, Portugal can position itself as a key player in this emerging, innovative, and potentially highly impactful sector.

The operationalisation of Santa Maria will also generate **regional and industrial spill-over effects**, attracting companies to establish operations in Portugal and supporting the further development of national testing, integration, and ground support facilities. This will stimulate the Azorean economy and reinforce Portugal's position in the European space value chain. To attract commercial operators and strengthen the ecosystem, Portugal could introduce targeted fiscal incentives (e.g., through SIFIDE or regional tax benefits) for launch companies establishing in Azores, or continued participation in ESA's technology demonstration programmes such as Boost! Or small launcher initiatives like the European Launcher Challenge. In the longer term, the establishment of launch infrastructure could also inspire the emergence of national launch capabilities.

Furthermore, access to space will enable educational and R&D opportunities, fostering **collaborations between universities and industry**. Dedicated training programmes, internships, and hands-on projects in the launch segment could be supported through the Portuguese Space Agency, FCT, and ESA's educational programmes, ensuring that local talent is equipped for future operations.

Portugal already has a national framework governing space activities, in particular space transportation. However, the proposed EU Space Act (which may be amended during the legislative process) could, once adopted, introduce new obligations that would necessitate updates to the national regulatory framework. To remain competitive, Portugal should **ensure that once potential updates are clear, its frameworks are clear, efficient, and business-friendly**, enabling faster permitting and greater investor confidence. Inspiration can be drawn from New Zealand's model, where transparent legislation and streamlined licensing processes have successfully attracted private investment and commercial launch activities while ensuring strong governmental oversight.

Portugal already plays a significant role in the European ground segment ecosystem, hosting several facilities that support space operations and data reception, including Santa Maria, which is part of ESA's ESTRACK network and has seen a contract extension with ESA of more five years in 2023. With further upstream activities and launch capabilities developing in Portugal, the ground segment is expected to continue evolving to support both public and private missions. The country can consolidate this position by **expanding existing stations, following a thorough evaluation of needs** from both government and industry missions. Portugal could support the development of

additional high-capacity antennas for private missions, Copernicus, SatCom and deep space via public-private partnerships, co-funding (e.g., ESA ARTES Competitiveness & Growth programme). In parallel, deeper integration with ESA's ESTRACK and ARTES networks can be achieved through formal agreements, joint operations exercises, and shared infrastructure initiatives.

Portugal contributes significantly to EU Space Surveillance and Tracking (EU SST) via facilities such as PASO and operators like Neuraspace and GMV, which supply optical and radar sensor data and participate in EU-funded initiatives (e.g. EMISSARY). Though not all national sensors have been identified as EU SST nodes, Portugal could look to leverage its existing and upcoming infrastructure to **deepen its involvement**. To capitalise on this, Portugal should formalise sensor-data sharing and negotiate integration with EU SST & ESA's Space Safety Programme.

Another critical focus for the launch and ground segment is cybersecurity: operations must ensure the highest security standards. Portugal can **strengthen its capabilities through targeted education and training for space operators**, leveraging EU initiatives such as EU Agency for Cybersecurity (ENISA)'s programmes including the EU Academy. In parallel, ESA's Space Cybersecurity Training Course, offered through the ESA Academy, provides hands-on experience in identifying and mitigating threats to space systems. Nationally, Portugal should also reinforce **cybersecurity standards** aligned with the forthcoming EU Space Act to ensure compliance and resilience across the sector. Effective implementation will require close coordination between the Centro Nacional de Cibersegurança (CNCS), the Ministry of Defence, the Portuguese Space Agency, and ANACOM, ensuring a coherent regulatory framework that addresses both civilian and defence space infrastructure.

6.3.4. Space science & exploration

Portugal possesses a solid foundation for advancing its role in space science and exploration. Research institutions are active contributors to planetary science, astrophysics, and space robotics, often in collaboration with ESA and other international universities. These academic strengths are complemented by Portugal's growing high technology, including advanced competencies in microelectronics, optical systems, precision manufacturing, embedded software, and artificial intelligence. Key Portuguese companies have developed capabilities in satellite avionics, guidance and navigation control (GNC), on-board data handling, and remote sensing instrumentation, all of which are directly applicable to exploration missions.

Portuguese space science and exploration capabilities are aligned with the national priorities outlined in the Portugal Space 2030 Strategy and the National Strategy for Science, Technology and Innovation 2030 (ENTEC), both of which identify **space science as a driver of innovation and knowledge-based growth**. At the European level, Portugal's goals are consistent with the ESA Exploration Roadmap. Continued participation in ESA programmes such as ExoMars and promoting the participation of more Portuguese companies in the Lunar Gateway offers Portugal the opportunity to deepen scientific collaboration while strengthening its technological base. These collaborations within ESA, and with international partners such as NASA are vital to establishing and building Portugal and its entities presence and reputation in the space sector on the global stage.

Building on the best practice identified from the Czech Republic, as well as having been pursued by Spain and Sweden, Portugal should consider the potential benefits of investing in an astronaut

mission. Launching an astronaut offers a range of strategic benefits for emerging space nations. It enhances **national prestige** by showcasing technological advancement and serves as a powerful **diplomatic and marketing tool** both domestically and globally. Such missions also have **strong inspirational value**, encouraging students and youth to pursue STEM education and careers. Additionally, they help **build strategic alliances** and capacity by fostering partnerships with public and private sector players. Beyond these, spaceflights offer unique opportunities for scientific research in areas like biology and medicine.

To pursue this goal, at least as long as the ISS remains operational or in the event of a potential future European commercial space station or similar venture, Portugal would have two primary paths to consider, pursuing an astronaut as part of ESA, or independently with a private entity such as Axiom.

Exhibit 60: Private vs ESA astronaut comparison

	Sending an astronaut with ESA	Sending an astronaut privately
Pros	• **Prestige & Legitimacy:** ESA astronaut flights carry strong international recognition and credibility • **Integrated Science & Technology Return:** ESA flights are tied to European research drives and give access to ISS utilisation rights • **Shared Cost:** Member states benefit from pooled funding, reducing the financial burden of a single seat • **Longer Missions:** ESA astronauts typically stay for months, enabling deeper scientific and operational contributions	• **Flexibility & Speed:** Private companies can often arrange missions faster than the long ESA queue • **Customisation:** Training, mission design, and outreach activities can be tailored (e.g., industry experiments, national branding, PR) • **Visibility & Prestige:** A national astronaut flying commercially stands out as a bold, independent step • **Commercial Partnerships:** Opportunities for industry collaboration and payload integration, boosting the Portuguese space economy
Cons	• **Limited Access:** Seats are scarce, and national allocation depends on ESA's internal politics and budgets • **Slow Timeline:** Astronauts may wait years for assignment due to long planning cycles • **Lower National Branding:** The flight is "under the ESA flag" rather than purely national, which may reduce visibility for Portugal • **Less Customisation:** Payloads and outreach are prioritised under ESA programmes, leaving less room for Portuguese objectives	• **High Cost:** Commercial seats are expensive (tens of millions per astronaut) and fully borne by Portugal • **Limited Integration:** Missions may not be as embedded in ESA's long-term scientific and exploration programmes • **Shorter Duration:** Many private flights are short-term (e.g., 1–2 weeks), reducing the scope of science projects and goals • **Prestige Risk**: Can be perceived as "buying a seat" rather than earning one through ESA selection

As illustrated above, **pursuing a Portuguese astronaut mission through the ESA offers clear advantages in terms of prestige, legitimacy, and scientific integration**. ESA missions provide access to world-class research infrastructure, ensuring that Portugal benefits from shared technological returns and participation in long-duration missions at a fraction of the cost of independent or commercial efforts. This pathway also reinforces Portugal's standing within Europe's cooperative framework, demonstrating commitment to collective exploration and yielding high visibility in international scientific circles.

However, participation through ESA also presents limitations. Opportunities for astronaut selection and flight are highly competitive and infrequent, meaning national access is limited and dependent on ESA's overall scheduling. Missions are slower to materialise and offer less flexibility or customisation to serve specific national goals. Additionally, as astronauts fly under the ESA flag, the branding and visibility are more European than purely national, which can dilute Portugal's individual recognition despite the shared success.

On the private side, Turkey provides a good international example through its overall space programme, and specifically through the pursuit of **human spaceflight by partnering with Axiom on their third mission** to the ISS. As part of the mission, a Turkish military pilot, Alper Gezeravcı,

spent three weeks on the International Space Station as the first Turkish astronaut. This milestone was hailed as “a new symbol of a growing, stronger, and assertive Turkey” by President Erdogan, while the Industry and Technology Minister declared that the mission was “a first, but it will not be the last. A new page has been opened in space science & technologies for Turkey”. Overall, the mission served to deepen partnerships with international actors, market Turkey’s burgeoning space sector, and encourage interest in space education, as multiple calls between students and the ISS astronauts were held during the mission.

Beyond an astronaut mission, **Portugal can build on its expertise in automation and AI-driven mission operations.** Portuguese research groups working on autonomous navigation and systems control are well placed to support ESA lunar surface and Mars exploration missions. In particular, university-industry partnerships focused on AI-assisted mission control and advanced data analytics could serve as an initial step, building national capacity and establishing Portugal’s presence in cutting-edge space exploration technologies.

Portugal’s **future in astronomy could focus on consolidating its scientific excellence while expanding technological and industrial participation** in international missions. Building on the achievements of and its involvement in missions such as Euclid, CHEOPS, and PLATO, Portugal can deepen its contributions by supporting participation in international telescope infrastructure and strengthening collaborations with organisations like ESO. To sustain scientific capacity, long-term research positions, including doctoral and postdoctoral roles, should be ensured, enabling the development of high-quality research. On the industrial side, targeted support for instrumentation R&D can enhance Portugal’s capabilities in space and Earth observation instruments, creating synergies between astronomy and broader EO technology development.

Internationally, the Artemis Accords, which Portugal announced in 2024 that it is evaluating the possibility of joining, **could provide access to advanced technologies and reinforce global Portugal’s position**.[42] Indeed, Portugal is well positioned to contribute, despite its relatively small size, due to its strengths in autonomous systems, materials science, miniaturised satellite technologies, and mission operations. A thorough analysis of potential contributions of Portugal to the programme is needed, but key actors in the sector are already capable of providing specialised expertise in areas relevant to Artemis missions. Such engagement could be particularly effective in boosting Portugal’s access to collaborations with international entities such as NASA, JAXA, or other Lusophone countries looking to participate.

6.3.5. Emerging technologies

Portugal is increasingly well positioned to expand into high-value emerging space technologies, building on **strong foundations in life sciences, biomedical research, and advanced manufacturing**. Universities such as the University of Porto, NOVA University Lisbon, and the University of Coimbra host research initiatives in space health, bioengineering, and aerospace medicine, and the Gulbenkian Institute of Molecular Medicine currently hosts the ESA biobank. This last point is of particular note as it is currently the only location to host biological samples collected by ESA from both space missions and terrestrial experiments.

[42] https://pt.usembassy.gov/joint-statement-on-the-51st-u-s-portugal-standing-bilateral-commission/

Portugal's priorities are set to coincide well with those of ESA in this field, providing potential for future collaboration and cooperation opportunities for Portuguese industry and academia. The Portugal Space 2030 Strategy identifies innovation and technology development as central to advancing the national space economy, while its active participation in ESA's Commercialisation and Human and Robotic Exploration programmes and Horizon Europe provide a natural policy and funding framework for Portugal's emerging space life-science sector.

Portugal can position itself to participate meaningfully in microgravity biomedical research, although this field remains in an early, pre-commercial, phase. While the long-term potential of biomanufacturing in space, including protein crystallisation, tissue engineering, and biomaterials production, is increasingly being discussed, true commercialisation is not yet feasible given the absence of a fully operational commercial space station (given the decommissioning of ISS) and the lack of availability of production infrastructure per se. Nevertheless, in-orbit manufacturing and R&D in the pharmaceutical industry will require consistent and reliable access to space and especially re-entry / return to Earth capabilities, which Portugal can offer through its Santa Maria spaceport. Indeed, several European companies (e.g., Atmos Space Cargo, Exploration Company, Orbital Paradigm, Space Forge, TASI and Space Rider) are now developing their microgravity laboratories to sidestep the requirement for a space station. For the short-term future however, progress will depend on experimental research and technical/economic viability assessments rather than market-scale manufacturing. Portuguese institutions should therefore focus on ground-based studies, supported by occasional parabolic flight campaigns, building capabilities in experiment design, data analysis, and payload integration, while contributing to the growing body of research published from ISS-based biomedical experiments.

To advance this agenda, **collaboration between pharmaceutical firms, biomedical researchers, and space technology companies will be essential**. Partnerships involving space companies and biotech-focused clusters could help identify key use cases for microgravity conditions and develop the necessary R&D frameworks. Once technologies are validated and safety and clinical requirements are met, the next challenge will be to build the supporting infrastructure required to scale and commercialise these solutions. Portuguese space companies may contribute to the development of specialised infrastructure and payload systems, such as vibration isolation, thermal management, and sterile containment solutions, tailored to the sensitivity of biological materials. Additionally, Portuguese life sciences and space–life sciences sectors are expected to actively participate in these initiatives.

To achieve these goals, collaborations between pharmaceutical companies, biomedical researchers, and space technology firms should be actively encouraged through initiatives such as **discussion forums, networking events, and targeted matchmaking**. These efforts should be supported by a combination of national innovation funding and EU instruments, including EIC Pathfinder and Transition, ESA commercial microgravity calls, and Horizon Europe, which can provide co-funding and milestone-based grants.

Portugal should aim to make itself an attractive testbed for space biotechnology. Creating a "microgravity health tech sandbox" with streamlined and clear permits, ethics and biosafety review processes, and testing frameworks would give startups and research centres an attractive and safe environment to prototype space-enabled healthcare solutions for early phase testing and trials. This

initiative could be modelled on other health sandboxes recently inaugurated by global innovators such as Singapore or other innovation facilitation projects being developed across the EU.[43]

Another area with clear potential is in-orbit manufacturing and materials processing, including 3D printing, sintering, and additive manufacturing of structural components, advanced alloys, high-performance fibres, semiconductors, and optical materials in microgravity. Beyond reducing launch costs, these activities enable the production of materials with superior properties, foster technological innovation, and create applications across multiple industries, from aerospace and defence to photonics and high-performance engineering. Established Portuguese players with expertise in precision manufacturing and thermal control systems are well positioned to contribute to joint R&D projects under Horizon Europe, developing next-generation materials and components that leverage the unique conditions of space. Indeed, Space Forge have specifically planned to use Santa Maria to return their in-orbit manufactured products back to earth.

A third priority area is **in-space assembly and servicing (ISAM), including inspection, repair, and life-extension technologies** for small satellites. Portugal has engineering firms with strong capabilities in automation, robotics, and GNC systems, and an ISAM focused company, D-Orbit, who have expressed the intent to further expand their activities in Portugal over the coming years. Active participation in ESA programmes can be instrumental in developing small-scale robotic servicing platforms, enabling Portuguese companies to contribute to next-generation satellite maintenance, modular assembly, and sustainable space operations.

6.3.6. Defence & security

Portugal possesses a growing set of resources and institutional foundations to strengthen its role in the defence–space domain. The country benefits from a strategic Atlantic position, offering an ideal location for surveillance, communications, and early-warning infrastructure. The Portuguese Armed Forces and the Ministry of Defence have increasingly recognised space as a key enabler of security and operational resilience, while institutions such as ANACOM, the Portuguese Space Agency and the National Cybersecurity Centre (CNCS) provide the governance and technical backbone for secure operations.

National industry, though still developing, already includes **firms capable of delivering encryption technologies, secure software, and satellite subsystems**, forming the nucleus of a future defence-oriented industrial base. The Santa Maria launch site is a tangible asset that can be leveraged to enhance space situational awareness, ensure secure data relay, and strengthen Portugal's operational autonomy.

This emerging **capacity aligns closely with European and transatlantic strategic frameworks. At the European level**, Portugal's priorities in space defence are consistent with the EU Space Strategy for Security and Defence, the IRIS² and GOVSATCOM programmes, and the broader objective of ensuring European strategic autonomy. Through these mechanisms, Portugal can access secure communication networks while contributing to Europe's collective resilience. Cooperation with ESA also provides opportunities to reinforce Portugal's industrial and technological base which can later

[43] https://www.synapxe.sg/media-releases/innovation/new-healthx-sandbox; https://www.eiopa.europa.eu/about/governance-structure/joint-committee/innovation-facilitators-eu_en

be applied in dual-use R&D initiatives, such as secure communications payloads and satellite navigation enhancements. As discussed above, ESA ERS should be a key consideration here, in particular given its dual use nature and Portugal's strong positioning with its active role in the Atlantic Constellation.

Strengthening cybersecurity and secure communications will be fundamental to protecting Portugal's defence-space infrastructure. The introduction of space-specific cybersecurity standards and certification procedures, developed jointly by the Ministry of Defence, CNCS, ANACOM, and the Portuguese Space Agency, could ensure data integrity, network security, and mission continuity, and prepare Portugal to comply with the requirements of the upcoming EU Space Act. Increasing research funding for universities and institutions on key areas such as quantum encryption technologies would further enhance Portugal's ability to safeguard national and allied assets from emerging.

In parallel, **Portugal should expand its robust space domain awareness (SDA) capabilities** to detect, track, and mitigate risks in orbit. Ensuring that Portugal's existing national network of optical and radar tracking systems are effectively prepared to serve both civilian and defence needs would improve both national monitoring capacity and facilitate integration with EU and NATO surveillance systems, should this be required. Additionally, hosting a dedicated Atlantic Surveillance Hub, combining maritime, orbital, and border control data streams, could enable Portugal to play a leading role in regional security monitoring and early warning.

Ensuring industrial and technological sovereignty will also be essential. As a first step, Portugal should conduct a detailed **mapping of their critical supply chains**, with particular focus on those that extend beyond national and European borders, to begin identifying exploitable dependencies and working towards solutions.

Alongside this, **targeted public procurement and R&D grants could help Portuguese companies establish themselves** as key players in the Portuguese and European value chain of secure space systems. For example, the creation of clusters focussed on established Portuguese strengths such as embedded secure software, encryption, and GNC systems could bringing together key public and private entities and defence suppliers for European and NATO programmes. Promoting further participation in EDF initiatives would also allow national actors to develop dual-use solutions and strengthen Portuguese capabilities while participating into wider European value chains.

Annex A. Stakeholder consultation

Survey results

The survey has been shared to over 150 stakeholders, attempting to target all relevant players within the Portuguese ecosystem. Of these **39 answers were received**. While this may initially appear to be a relatively low response rate it is worth noting that many of the 150 entities contacted are either small one-two person start-ups or even currently inactive in the space sector. As such, the 39 answers received cover a significant portion of the key stakeholders within the Portuguese space sector.

The data collected from these has provided some interesting insights.

A wide variety of entities responded.

Exhibit 61: Survey respondent entity size distribution

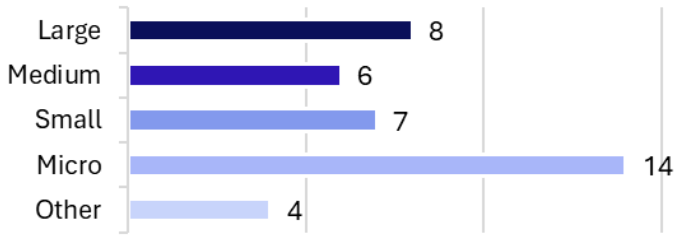


Exhibit 62: Survey respondents' breakdown of funding received

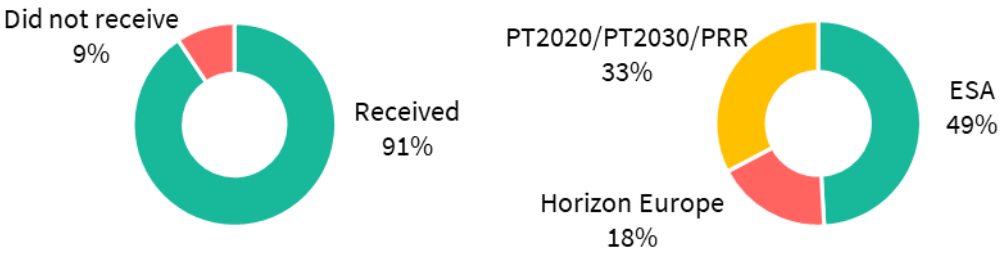
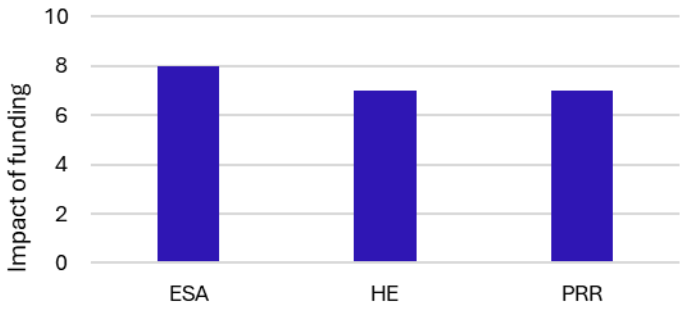
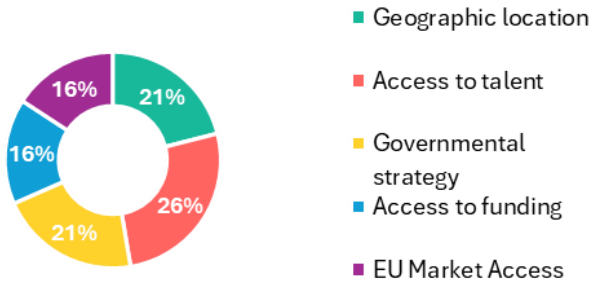


Exhibit 63: Respondent measures of funding impact by source



Almost all survey respondents reported having received some amount of external funding from non-private sources. Of this, ESA formed a notable majority, but national programs were also well represented. Indeed, while ESA is slightly ahead, all funding sources were broadly considered to be largely equal in impact. This is commensurate with the general perception of the Portuguese space industry gathered through research and interviews, that being that it is very heavily reliant on ESA funding. However, this strong engagement with ESA should not inherently be seen as problematic, indeed, ESA can be a key springboard for smaller companies to gain talent and experience to facilitate their future growth and expansion. The main danger, as also identified in interviews, is that many smaller companies become over reliant on ESA and other funds, focussing only on their continued acquisition over commercial development and future market viability.

Exhibit 64: Respondents' reasons for opening a subsidiary in Portugal



The results shown above are of particular interest given the wide spread of options selected, though it is worth noting the **significant interest in talent availability and governmental strategy in particular**. These results suggest that the recent growth of space-related courses in Portugal has not gone unnoticed and should be further stimulated. Moreover, a positive and attractive governmental strategy is also of clear importance, future efforts in streamlining licensing and legislation should therefore not only be pursued but clearly advertised. Alongside this, available funding opportunities should be made clearly understandable and their requirements simply communicated. Lastly, Portugal's key geographic positions, in particular the Azores perfect Launch position, should be highlighted at events on the international stage.

Interviews

Despite an initially slow response rate from the 32 targeted stakeholders, **28 interviews were completed**, including four in person via the national expert.

The first key subject that has been frequently raised is **ESA; it is still seen as a necessary and important avenue for the growth of Portuguese space activities**. Both given its ability to augment Europe's voice on the international stage, and to help support the growth and talent development of smaller players in the sector. Some respondents characterised ESA as a potential "slingshot" for Portuguese business. However, respondents also noted that Portugal's current engagement strategy could potentially be improved via more focussed funding; the aim being to invest more in fewer projects, so as to get a more significant role in those it did chose to pursue.

On the subject of the Portuguese Public sector, there was **a general perception that the Portuguese Space Agency was already doing good work and that its engagement with industry**

was highly appreciated. That being said, many respondents felt that more work should be done to help politicians and policy makers better understand the nature of the space sector and how it could benefit from a broader cross-sector adoption strategy. This is because of the uniquely long-term nature of space, compared to most other sectors, and its need for longer-term investment, policy support, and strategic guidance. Indeed, an increase in cross-sector adoption of space services was also considered to have the potential benefit of providing more opportunities for the Portuguese Government to act as the anchor tenant for Portuguese companies in the process of maturing their products and developing a fully market ready growth strategy. This is especially important as the space sector is also highly dynamic, and new trends can emerge rapidly, requiring quick and agile responses from industry to capitalise on them. As a result, interviewees highlighted the importance of increasing documentary transparency and information sharing on behalf of the Portuguese Space Agency, as well as continuing to streamline and clarify licencing and funding application processes.

Finally, regarding strategy, **respondents were notably split on the topic of government guidance in terms of focus areas for technological and commercial development**. While such strategies were supported by some, and have been proven successful by countries like Greece, others felt that it was not appropriate for the Portuguese context. These interviewees argued for a more hands-off approach, that Portugal should, given its lack of large funding capacity, focus on allowing industry to identify its own direction and priorities with their market knowledge, and simply support these efforts where it can.

Annex B. Economic analysis – input/output model details

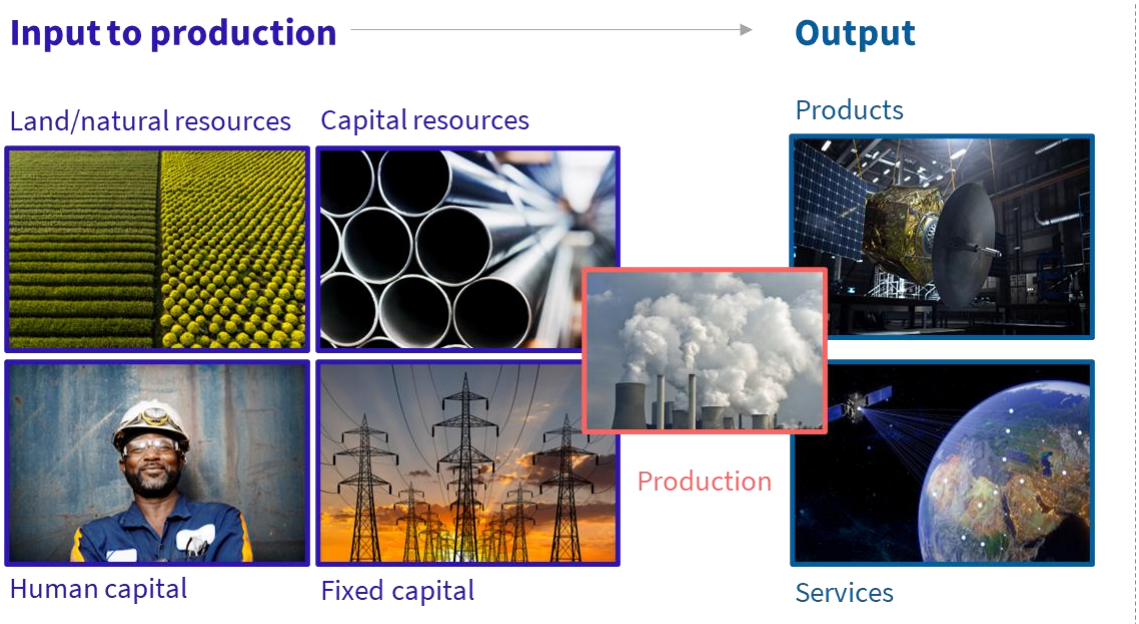
Input-output model

An Input-Output (I/O) model measures the economic ripple effects of an industry across an economy, and it is useful for calculating the industry's impact on economic activities, such as employment and contribution the national Gross Domestic Product, the latter of which is Gross Value Added (GVA). The **economic impact of the space industry in Portugal was estimated through an I/O model, providing consolidated figures with focus on the 2019 to 2024 period**.

I/O modelling enables the **analysis of inter-industry relationships, capturing all monetary market transactions between industries**. Using this approach, the study assessed the total **economic output, the Gross Value Added, Employment** and other relevant macroeconomic results (e.g., Government Tax Revenues) supported across Portugal, including direct, indirect, and induced effects.

It is important to note that **indirect and induced effects are not catalytic effects**. I/O models only measure economic effects, not broader benefits such as innovation, research progress, or societal/social change. All those **wider benefits of the space sector are included in the analysis qualitatively** to provide context to the economic findings and outlining the farther-reaching effects of the Portuguese space industry.

Exhibit 65: High-level view of input-output elements



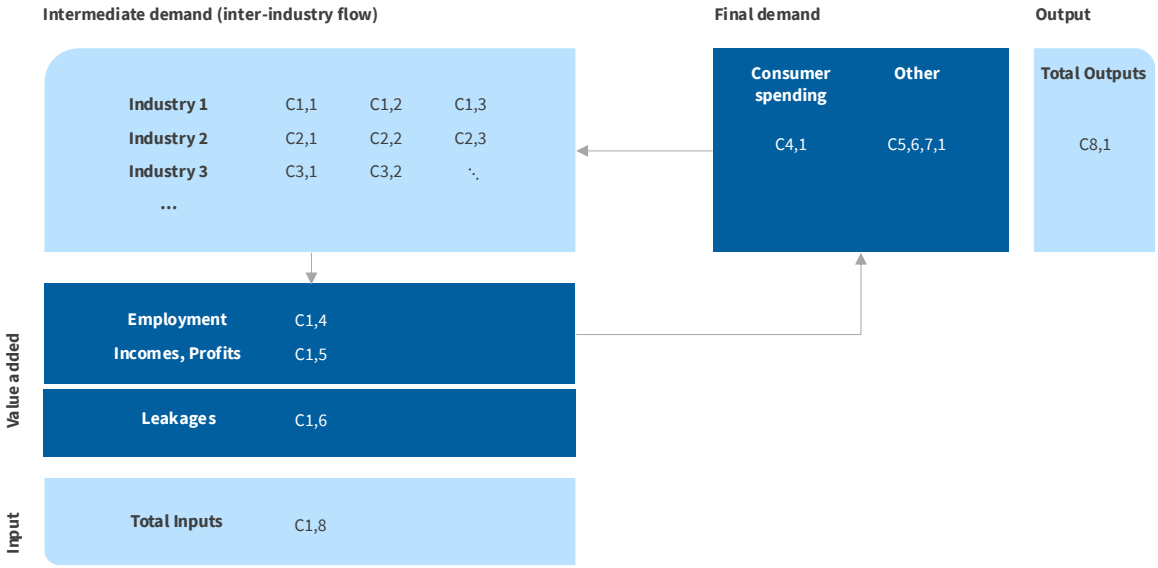
I/O tables describe the **sale and purchase relationships between producers and consumers within an economy**. The tables rely on empirical data about the flow of goods and services among all relevant national industries and define how much output (across all industries) is required to

satisfy an amount of demand in one industry. I/O models use the **Leontief inverse matrix**. An input-output table shows how much each industry buys from and sells to every other industry.

- Rows: What each industry **produces/sells**
- Columns: What each industry **purchases**

Thus, **C_{ij} represents the flow supplied by industry i (row) and used by industry j (column)**. For example, C_{12} indicates that industry 2 purchases from industry 1, while C_{11} indicates the internal use of means of production by industry 1. In the model, each industry also has additional columns (e.g., 4, 5, 6, 7) representing purchases originating from outside the inter-industry flows. These include consumer spending in the industry as well as final demand from the government and other institutions. This structure is similar for additional demand (purchases) and value added, which represents income and generates further consumer spending. Intermediate demand plus final demand sum to total industrial output, while value added and leakages (values associated with the modelled event that do not continue circulating through the region's economy to generate additional effects) sum to total inputs. In a Leontief model, outputs and inputs are always in balance: total output equals total input requirements plus final demand.

Exhibit 66: Conceptual representation of a SAM table

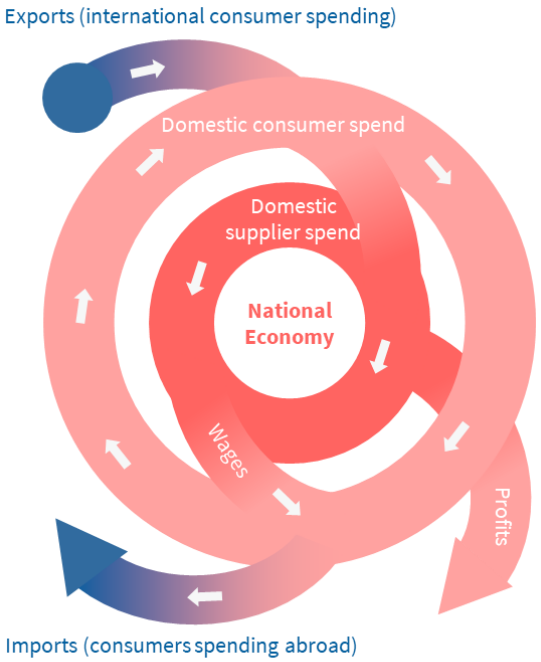


This project utilised a **software developed by the IMPLAN group**, incorporating Portugal-specific I/O tables developed with OECD data. These tables present **matrices of inter-industrial flows of goods and services produced domestically and imported, in current prices (USD million), for all OECD and G20 countries** (including Portugal), covering the period from 2018 to 2020. The Input-Output tables track economic activities through 46 mutually exclusive industries based on ISIC 4 codes, collectively representing the entire economy. IMPLAN utilises a specific type of I/O tables, called **Social Accounting Matrices (SAM).** SAM are static matrices that trace all market and non-market driven monetary flows throughout a Region for a given period of time. SAMs expand upon the traditional I/O tables to also include transactions between Industries and Institutions and between Institutions themselves, thereby capturing all monetary transactions each year. The software allows users to input events associated with their respective industries. In this case, the

events inputted includes direct industrial output for Portugal and Portugal's **government final demand towards non-commercially provided goods and products**.

IMPLAN is a trustworthy provider of input/output matrixes in the sector and is utilised by stakeholders such as NASA to generate its economic impact reports.

Exhibit 67: Schematisation of the input/output model as a flow of spendings and purchases



Source: adapted from Oxfordeconomics/Novaspace (ex-Euroconsult) - Terrae Novae: from inspiring Europe's generations to supporting its economic growth

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