

TARGETED STAKEHOLDER CONSULTATION BASED ON THE STAFF WORKING DOCUMENT “FOR A RESILIENT, SUSTAINABLE AND DIGITAL AEROSPACE AND DEFENCE INDUSTRIAL ECOSYSTEM: SCENARIOS FOR A TRANSITION PATHWAY”

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Preamble

Today, the **European space sector tackles some of the most pressing challenges of our times**, such as monitoring and fighting against climate change, helping to stimulate technological innovation, and providing socio-economic benefits to citizens. Institutions, business and citizens increasingly rely on space technology, data and services for communication, navigation and positioning systems, and Earth observation enabling to provide essential services (such as immediate information and on spot communications when disasters strike, support live coverage of global events and real time news, cost-effective multimedia broadcast, enable precise weather forecasting etc.). The way space permeates and brings added value to humanity is growingly recognised and confirmed by EU policies.

Key ally to serve the objectives of the EU Green Deal, the public services Earth Observation programme Copernicus has become a world-class reference for climate change and environmental monitoring. It directly contributes to addressing and finding solutions to some of the major challenges of the coming decades for all European Union citizens, and to supporting Europe’s role on the world stage.

There is also the economic and industrial dimension to space. The European space industry, represented by Eurospace, contributes to the development, production and deployment of European critical infrastructures for communications, meteorology, transportation and strategic applications. Encompassing all sectors of our economy, providing tangible benefits for our citizens and businesses, while providing the means to ensure the strategic autonomy and the resilience of Europe, **space has an essential dimension to the functioning of our society that cannot be jeopardised.**

At the end of July, the Commission officially launched the preparation of a dedicated Transition Pathway for the Aerospace and Defence (ASD) ecosystem with the publication of a Staff Working Document (non-binding working document published by the services of Commission) and the opening of a consultation.

The European space industry welcomes the need to further accelerate the green and digital transitions and increase the resilience of the EU industrial ecosystems.

More importantly, the creation of this Transition Pathway **finally echoes the long-time call of the European space industry for the EU to eventually devise a real, and ambitious, space industrial policy**, in particular as this initiative is also supposed to address the “long term resilience of the sector”; such an industrial policy is needed to stay up-to-date and apprehend at best the characteristics of the European space sector.

Apprehending the characteristics of the European space sector

While the intention of the European Commission to push forward the issue of the Aerospace and Defence industry is very much welcome, it is still challenging to combine aerospace and defence considerations, because apart from the fact that many of the products for these sectors are manufactured by the same major industrial groups, the volumes of business and, above all, the markets are very different.

In this regard, **four main characteristics (largely developed in Annex 1) reflect the current dynamics of the European space sector**, measured in an accurate and transparent way by Eurospace every year since 1996:

- The core business of the European space industry (strong of 57000 highly qualified workers) is with **European public customers** (and ESA more specifically¹) which represent more than half of sales in 2022;
- The European space sector is making between 35-50% of its turnover on the **open “commercial” market** – it is the only space “power” in the world where this situation exists;
- On the space exports markets, the European space industry in the past decade represented 10B\$ in sales in the spacecraft segment, and 6B\$ in sales in the launcher segment, **generating a net surplus to the European trade balance worth 900M\$ every year in the past decade**.
- The sales of the European space industry are located mainly in Europe (73% of final sales). Exports represent a smaller, but significant share (27%).

The European space industry’s most pressing challenges ahead

Stagnating Institutional programmes for spacecraft systems

Institutional programmes for spacecraft systems are stagnating in the key application segments (telecommunications, GNSS and Earth Observation), after last year's marked growth (supported by the regular opportunities provided by the EU flagship programmes). Thankfully, this is compensated by the regain of interest (and business opportunities) provided by scientific programmes (and particularly robotic exploration, that is one of the main growth programmes in the ESA perimeter).

¹ Worth 2,949 B€ of revenues in 2022. In this total, the European Commission programmes delegated to ESA represent an estimated 810M€ worth of revenues for the sector. In addition, after ESA, national space agencies in Europe represent the most sizeable share of revenues from European institutional programmes, worth 916 M€.

A worrying trend for launchers

Institutional programmes for launcher developments exhibit a worrying slowdown, with a variety of causes (from the COVID-related delays in development activities to the technical difficulties of new and legacy European launchers) leading to the postponement of critical milestones and the reduced outflow of contract payments. The situation of Europe's launcher supply chain in 2022, already deeply affected by the Russian sanctions, remains a subject of concern for policy makers and customers alike. In 2023, with technical issues still plaguing the VEGA launcher, and Ariane 6 maiden launch likely further pushed to 2024, the European launcher sector is looking at the future with concern, and the emerging micro/small launcher segment in Europe is not yet there to provide viable alternatives, let alone revenue opportunities.

In addition, the stark contrast in size between the European institutional domestic market and the captive American and Chinese market (i.e., over the last 10 years, when there were 25 institutional launches/year in China and 15/year in the US, there were only 3/year in Europe) further highlights the difficulty for the European launch industry to compete with foreign launch providers able to sustain themselves on a fully consolidated public demand. In order to support autonomous European access to space as a strategic imperative, **European preference should be implemented for all institutional launches and supported by a decisive increase in the size of domestic launch demand**.

The (too) rapid growth of the start-up ecosystem

There is growing concern with the rapid growth of the start-up ecosystem in Europe. The fact that 10% of industry workforce salaries are paid out of equity, rather than revenues, is a concern in the short to medium term. In order to sustain durably the emerging ecosystem of more than 400 new companies created in the past decade, and their >8000 employees in 2023, it will require about 1.2B€ of additional accessible demand every year. It is unclear today what customers would provide these additional business opportunities, even in the context of growing investment of European space institutions. The IRIS² constellation will provide growing opportunities in the medium term. In the longer term, the progressive shift of European space policies allowing to embrace the defence dimension of space programmes may create a brand-new array of programme opportunities for the European industry².

The strategic issue of non-dependence and security of supply

Europe's dependence on the supply of a number of components is detrimental to the competitiveness of the European space manufacturing industry.

The technological non-dependence of the space sector is not guaranteed: on a number of critical technology areas, European programmes are fully dependent on a single supplier outside Europe.

Those necessary imports to make European spacecrafts (and launchers) functional are **subject to US export regulations** (i.e. International Traffic in Arms Regulations – ITAR), but:

- It is often creating procurement delays;
- It is putting the European space industry in a situation of additional dependence in the short term.

² It is worth noting that the military/strategic dimension of space has always been extremely weak in Europe, setting it aside from the other three major space powers (the USA, China and Russia) where military programmes are leading the way from a capability and technology standpoint.

It is thus necessary for the European public entities as well as the European space industry to ensure in the future that the technological non-dependence and the security of supply is fully covered. There are many challenges to be dealt with in the short/medium term:

- The **need to replace or update existing technologies and products**;
- The **challenge to develop new ones**; and
- The **difficulty to maintain critical skills** on a market with long programme cycles and highly fluctuating orders.

A critical need to ensure the sustainability of space activities in Europe

More than any other sector, the space industry has to anticipate future developments in terms of product availability and regulations (see also Annex 2 regarding chemicals). This necessity to quickly adapt to long-term market needs is absolutely mandatory given the long time needed to develop space products.

A critical danger ahead lies in:

- The **dismantlement of the space industry's skilled workforce in case of insufficient workload**
 - Knowing that it is taking significant time and resources to reassemble the required teams, with often unique competences, to redevelop new programmes;
 - This challenge is all the more pressing as, at the same time, the **new space-faring nations are rapidly closing their 'researchers' gap' with the traditional space powers**.

Developing an ambitious space industrial policy

In September 2023, President of the European Commission Ursula von der Leyen addressed the European Parliament in Strasbourg for her State of the European Union speech. If space was not mentioned *per se* in the SOTEU address, the European Commission shared the main priorities and flagship initiatives³ for the year to come, building on the European Union's successes and achievements of the past years.

As part of the "Stronger Europe in the world" pillar, the European Commission announced that it will propose a European Defence industrial strategy. A European Defence industrial strategy is very much welcome in the current geopolitical context. **Space, dual by nature, would also very much benefit from a sectoral European-wide industrial policy in order to stay up-to-date and apprehend at best the characteristics of the European space sector.**

As such, it should take into account the **strategic aspects and the nature of space programmes**, as well as the **unique reliance of the European space industry to the very limited open markets**, and having as objectives to guarantee the **availability, continuity and quality** of the services deemed necessary and delivered by space infrastructures.

An ambitious space industrial policy should maximise the benefits of space for society and the EU economy while increasing the positions of its industry worldwide by preserving its long-term competitiveness.

This EU space industrial policy, **serving a resilient and competitive ecosystem, a greener ecosystem, and the road towards the digital transition**, should follow the **following incentives**:

1. Develop a tailor-made procurement policy;
2. Devise and implement an ambitious and efficient R&D policy, promoting consolidation and avoiding duplication;
3. Allow for market uptake and possible access to additional sources of financing;

³ i.e., EU Space Law and Strategy on Space Data Economy

4. Ensure the swift implementation of the priorities identified in Space Strategy for Security & Defence and promote space resilience;
5. Lean towards a greener ecosystem;
6. Address the export markets to foster the European competitiveness;

1) The development of a tailor-made procurement policy as a first crucial step

Renovating a “space-specific” procurement policy

- Along with the significant increase of the ambitions of the EU for the space sector, with the example of the EU Space Programme (i.e., Copernicus, Galileo/EGNOS, SSA/SST, Govsatcom), **the institutional demand for space activities is today driven by the political willingness to address societal challenges** (transport, environment, security etc.) and the **ambition to generate economic growth**⁴.
 - It is de facto a necessity for the European institutional market to **answer the new emerging needs of all operational space programmes** i.e., quality and guarantee of service, stability and sustainability.
 - This evolution will therefore predictably lead to **increased security needs** characterised by cybersecurity threats, security of space infrastructures (e.g., space debris or even aggression) and, lastly, the security of supply.
- Indeed, **Europe's dependence on the supply of a number of components** is detrimental to the competitiveness of the European space industry.
 - On a number of critical technology areas, European programmes are **fully dependent on a single supplier outside Europe**. The issue of non-dependence is therefore a subject of concern among the European Commission ESA, EDA and the space manufacturing industry, all gathered inside the Joint Task Force for Critical Space Technologies for European Strategic Non-Dependence, where systematic assessments of the situation are supposed to be made to ensure the coordination at EU level of the dependence reduction⁵.
 - Those necessary imports to make European spacecrafts (and launchers) functional are **subject to US export regulations** (i.e. International Traffic in Arms Regulations – ITAR), often creating procurement delays and putting the European space manufacturing industry in a situation of additional dependence in the short term.
 - It is thus necessary for the European public entities as well as the European space manufacturing industry to ensure in the future that the technological non-dependence and the security of supply is fully covered:
 - Dependence reduction is a moving target: there is not one single response, and the fight against dependence is often a long run requiring ongoing support over the years:
 - Reactivity and speed are key features to win the dependence battle;
 - Consistency and continuity of actions on identified subjects are prerequisites for success;
 - Constant monitoring for new dependencies is key.
- It is therefore of prime necessity that the **EU Space programme is being used to implement a European public space procurement** policy that takes three parameters into account:
 - The **space strategies of our direct competitors**. Each country has its own specificities but the objective of independence, or even domination, is commonly shared.
 - Moreover, the **unequal situation of worldwide captive markets** (see Annex 1) creates a huge capability and technology gap between Europe and its direct competitors on

⁴ The first objective of the 2016 Space Strategy for Europe is indeed to ‘maximise the benefits of space for society and the EU economy’.

⁵ In reality, the JTF process has many flaws (i.e., lack of reactivity, lack of follow-up, industry as second class stakeholder, critical dependence assessment used as a tool to promote development activities), but the interest for technological dependence reduction, sovereignty and autonomy for space programmes is eventually, and fortunately, getting stronger in Europe with a renewed approach for the JTF.

- the commercial and export market, and should be taken into account by the European public space procurement policy.
- The **strategic aspects and the nature of space programmes**. Indeed, they are by **nature long-term** and **risky**.
 - The guarantee of **continuity and quality of the services** (when entered in operational phases). This must become a key criterion in addition to cost and “value for money”.
 - It is also of particular importance that the European Commission takes into account the needs of space systems in the “Chips Act” to develop components in critical dependency situations and to support the EU supply chains that are critical for European space missions, and in particular for the EU space programme (notably to contribute to the technological independence of IRIS²).
 - Indeed, efficient support to public and private investments in high-performance and high-reliability chips is crucial for European leadership in innovation and manufacturing, and for the performance of EU space missions, and to support long-neglected segments of the industry including foundries, test and design houses, and PCB/EMS⁶ manufacturers, that will need to innovate to meet the requirements of more sophisticated packages suitable for space missions;
 - An EU space procurement policy should also take into account the **situation of oligopolies** in the space sector which is characterised by a paradoxical situation:
 - On the one hand, institutions seek the multiplicity of potential sources to stimulate competition for the benefit of their future procurements.
 - But on the other hand, in a limited and relatively flat market where major long-term procurements are scarce, the industry, in an attempt to keep the critical mass and ensure the continuity of the workload in its critical skills, tends to concentrate itself.
 - Furthermore, the current policy trend differentiating the start-up ecosystem from the more established space industrial base, while aiming to foster innovation, ends up widening the divide between actors already collaborating within the same ecosystem. A more effective procurement policy at EU level should aim to foster enhanced collaboration rather than artificially enforce separate financial support rationales.

2) A secured and ambitious R&D support through Horizon Europe & the European Defence Fund

Today’s investment in innovation will be the driver of tomorrow’s competitiveness for the European space sector: maintaining Europe leadership in space implies indeed the availability of a first-rank domestic industry, able to design, deliver and exploit state-of-the-art space systems, required by public and private customers worldwide. **EU funding in R&D&I is needed to boost European competitiveness and innovation, and contribute to job creation and growth.** From this standpoint, the implementation of EU Framework Programmes, via relevant budgets, adequate tools and appropriate priority areas, shall ensure that Europe consolidates its leading position.

Devising and implementing an ambitious and efficient R&D (associated to a significant budget) shall aim at the following objectives:

- **Maintaining the technological readiness of the EU-owned strategic infrastructures** (EGNOS, Galileo, Copernicus);
- **Increasing the technological readiness for the development of products with a low environmental footprint;**
- **Preparing the development of the new components of the EU space programme** (SST, Govsatcom, IRIS²);
- **Support technological non-dependence in areas considered critical for European sovereignty and competitiveness;**
- **Establishing an efficient and sustainable common technology base for European space systems;**
- **Ensuring the necessary technological leadership** to be able to compete on open markets:

⁶ PCB: printed circuit board; EMS: Electronic Manufacturing Services

- The main expectation from the European space industry is, in this respect, to increase the impact of the EU Framework Programmes for space by a better consideration of industry needs.
- **Ensuring consistency among the various sources of funding for space R&D&I at national and European level** (European Defence Fund, Horizon Europe, European Defence Agency and ESA funded R&D and national agencies R&T programmes).
- The related R&D&I activities **must be driven by the European Commission**, and in a way that offers the **same opportunities to all European industries**, regardless of their geographic location in Europe.

Moreover, the European Commission should ensure that R&D&I activities:

- **Address the appropriate areas of space technology development;**
- **Mobilise the appropriate (grant-based) instruments;**
- **Have well-identified and channelled long-term budgets;**
- **Ensure the timely availability of advanced technologies** – with the appropriate maturity, the required level of non-dependence, and at competitive conditions.

It is important to bear in mind that focusing on competitiveness requires a **detailed knowledge of the expectations of the markets**. It can only be achieved through an **inclusive consultation of the manufacturers that are in contact with their customers**, whether they are private (commercial operators) or public (export markets). Therefore, a **strong link between the implementation of the EU space programme and the Horizon Europe programme** must be established to:

- **Increase the effort of competitiveness;**
- **Allow for more reactivity and open innovation**, including in large groups;
- Avoid dilution of budget by **supporting emblematic large projects** based on endorsed roadmaps, large budget envelopes, and over longer periods of time;
- **Increase and improve the support to technology maturity**. It includes the necessity to fund demonstrators to favour time to market;
- **Increase and improve the support to critical components associated with non-dependence.**

These priorities can be well-supported, in the frame of Horizon Europe and its follow-ups, by raising the ambitions **of the co-programmed partnership** between the public and the private sector to **enhance sector competitiveness (i.e., co-programmed European Partnership for Globally Competitive Space Systems)**. In particular, it would:

- Be the best tool to **implement and update a full-scale Strategic Research and Innovation Agenda (SRIA) for Space competitiveness;**
- **Enable the launch of large-scale projects and demonstrators** for next generation commercial and institutional missions (e.g. in telecommunication, Earth observation, launcher reusability but also cross-sectional space-relevant technologies e.g. digitalisation, advanced manufacturing technologies, etc.), supported by multi-annual planning and consistent budget envelopes;
- Have a paramount **impact on European space economy, research and downstream applications;**
- Be a vital **complement to the planned EU space programme;**
- **Ensure political visibility** of the European space sector in Horizon Europe and would federate the different actors (large industries, SMEs, research centres and academia) around common objectives and priorities, through appropriate and continuous strategic roadmapping, implementation and controlling.
- **Complement national programmes and ESA contributions.**

The need for digitalisation and new processes

The increasing worldwide space competition requires manufacturing business to explore new ways to design, manufacture, assemble, test and deliver products. Future services will also require better data collection and management from design to delivery.

In this regard, the European space sector is looking for new ways to modernise itself, strengthened by R&D support. More precisely:

- **Time to market needs to be reduced:**
 - Digitalisation (e.g., end-to-end connected factory) and design for manufacturing are key to produce products fit for the market on time whilst keeping the right level of product's quality.
- **Production costs need to be stimulated and be cheaper:**
 - End-to-end digitalisation (e.g., digital twin) is key to give access to the real-time data and insights at any production steps for all disciplines. It is the only way to make smarter and faster decisions in shop floors, which can ultimately boost the efficiency and profitability of the entire operations.
- **Smarter production sites need to be developed** based on efficient processes (e.g., advanced testing and manufacturing) to manage and optimise all aspects of the manufacturing processes and supply chain:
 - The ergonomic of production activities has to be improved.

In conclusion, the space sector digital modernisation will increase the attractiveness of the space industry, as a key to ensure that new talents will join to prepare the future.

3) Market uptake and possible access to additional sources of financing

Six promising lines of action to further assess and deepen have been identified. These approaches can, in addition, complement and reinforce each other:

- **The EU as a “prescriber”:**
 - “Prescribing” the use of satellite data can be done through regulation and standardisation, it is even more true for what concern the data and signals generated by the programmes under its authority:
 - For instance, the Regulation (EU) 2018/746 of 18 May 2018 allows data from the EU's Copernicus Sentinel satellites (“or other data with at least equivalent value”), to be used as evidence when checking farmers' fulfilment of requirements under the CAP for area-based payments. It is obviously a step in the right direction, but elaborating a standard based on Copernicus data would be an improvement, and another improvement would be not to simply “allow” the use of Copernicus data but making it compulsory;
 - Another example could be offered with Space Traffic Management (STM) for EGNSS: the existing systems for tracking satellites are decades-old and optimised for military use rather than for the purposes of safety and commerce. A new approach to space traffic management could impose the use of EGNSS transponders to report a spacecraft's position accurately, and with a very limited latency, to space-based receivers onboard on the new IRIS² constellation, hence offering a real competitive advantage to European space operators.
- **The EU as a driver to the emergence of sizeable markets:**
 - There are most certainly several public policies, as well as several B2B and B2C markets, that could rapidly benefit from (existing or rapidly deployable) operational space capacities or services that are currently inaccessible because the initial investments exceed the financial and technical capacities of any single Member State and, a fortiori, of any single user:
 - Therefore, mechanisms such as flexible and efficient “central purchasing organisations”, or pre-commercial procurements, or risk coverage through European Fund for Strategic Investments (EFSI), can be better implemented at Union level, to “mutualise” the costs and the risks and allow these potential users and markets to benefit from space-based services;

- Even the realisation of supporting space infrastructures able to deliver services to new space economy, in form of Infrastructure-as-a-Service (IaaS) or Platform-as-a-Service (PaaS), could be considered.
- **The EU as a facilitator of cooperation** between different industrial sectors (e.g., logistics, agriculture) and companies that develop new solutions, for example those based on Copernicus data, but also on all other components of the EU Space Programme.
- **The EU as a promoter of innovation** through its role as customer:
 - The European Commission has the possibility to use specific procurement procedures stimulating innovative industrial solutions and capable to encompass design and manufacturing phase in one single procedure.
- **The EU as an enabler of sustainable industrial growth** especially for non-prime space market suppliers with limited financial resources:
 - The European Commission has the possibility to install specific financing mechanisms enabling reduction of Capex investment risks for providers of critical space technologies for European Space programmes (e.g., IRIS²).
- **The EU as a support to export:**
 - EU institutions could work together to facilitate access to new markets by the active promotion of European capabilities and the development of a strong European economic diplomacy.
- **The EU as a promoter of European strategic autonomy** (as well as of safety and security initiatives)
 - The EU is a strategic actor in political terms, and this should be reflected in the way it stimulates the development of space entrepreneurship in the whole space sector, which is in turn a highly strategic sector.
 - In this particular domain, it is worth noting that the EU has set in place a number of innovative tools (Cassini, EIC, EIB/EIF...) entirely dedicated to support start-ups and, specifically, companies legally identified as SMEs, with specific rules of eligibility; however, in some occasions, these rules can prevent delivering financial support to companies which could play an important role in supporting key strategic autonomy objectives of the Union (and sometimes be the only ones in that case); again, it is recommended that the focus is on the product or the capability rather than on the size or age of the industry that would deliver it.

4) Ensure the swift implementation of the priorities identified in Space Strategy for Security & Defence and promote space resilience

Even more in the field of “military space” than on other space markets, captive government markets create externalities on space infrastructure market that distort the terms of the competition, at the detriment of the European space industry (i.e., limited space military programmes in Europe or no ambition for Europe-manned systems sustaining industrial activities on a long-run).

In such a context, **new EU policy actions have a key role to play to foster the competitiveness and innovation of the EU's space technological and industrial base** – and contribute to bridge the existing gap with the other space powers. In this regard, on March 10th 2023, the European Commission and the High Representative of the Union for Foreign Affairs and Security Policy published the Joint Communication “EU Space Strategy for Security & Defence”.

Europe’s effort towards gaining credible and assured autonomy in space for the implementation of its strategic autonomy is now a reality, and a shared effort across the continent. If the EU and its Member States do support the successful implementation of the Space Strategy for Security and Defence, it makes no doubt that

all efforts, whether civil or military, national or European, public or commercial must now converge towards efficiency and reliability for security users, as well as towards budgetary efficiency. The successful implementation of the Strategy will gnaw on traditionally nationally protected sectors, including in terms of procurement and benefits to industrial actors. **The major change that the Strategy is bringing to space policy in Europe is that it shall not be an EU-policy that will superimpose itself to national and multilateral ones, as it is in a way the case with the EU space programme.**

The realisation of the Strategy will therefore require a coordination and prioritisation system – not only to encourage synergies and budgetary efficiency, but also to avoid that a fragility in one part of the system (a loophole in a national legislation, a weakness in the cybersecurity of a private ground-segment, an unidentified dependence in a particular technology...) eventually weakens Europe as a whole. More precisely, this means that:

- Considering that current security-related EU space infrastructure are being undertaken by ESA on its behalf, **the EU ought to work hand-in-hand with ESA when new developments are needed, while ESA most probably needs to adapt in order to provide the necessary security guarantees to the EU and Member States via institutional solutions (accreditation, security of information, decision-making, data access and processing, security by design, staffing etc.);**
- **Involving Ministries of Defences in the system developments will be the central political issue to determine development effectiveness in all future systems;**
- Implementation of the Space Strategy for Security and Defence should **prioritise capabilities fostering EU strategic autonomy using a robust and coordinated industrial policy** to deliver best-in-class European-made capabilities.

Enhancing the resilience, responsiveness and protection of space systems and services in the Union is a must and it can only be achieved with the **development of new and improved technologies/capabilities (while preventing the proliferation of sensitive technologies and capabilities, including launch technologies which are innately dual-use in nature).** The EU shall indeed put priority on promoting space resilience via the swift emergence of an EU approach on Space Traffic Management relying on European Member States and industry expertise and capabilities & must implement the cyber-security and resilience of all its ground and space assets to bring certainty in missions' continuity and guarantee system resilience.

An underlying challenge to this objective is the **capability to increase the low-level of public investment currently limiting the ability of the European space industry to compete on equal footing with its competitors, particularly across the Atlantic, who benefit from a larger, more cohesive and captive domestic market.** Despite recent progress, the limited scope and fragmented nature of the EU's internal market for military space remains a limiting factor for the development of a more robust and competitive European Defence and Technological and Industrial Base (EDTIB) fully able to address the strategic challenges highlighted in the Joint Communication.

- The implementation the **European Defence Fund** or **IRIS²** can therefore offer a **new opportunity to boost institutional investment in strategic and military applications of space** – the central pillar of American, Russian and Chinese space policies.

Enhancing the resilience, responsiveness and protection of space systems and services in the Union also means implementing measures to support technological sovereignty and resilience of critical industrial value chains to ensure non-dependence; in this regard, the **key role of industry in the identification of dependence issues (and mitigation measures) needs to be recognised.**

- Europe is currently lagging behind in its ability to develop and manufacture advanced materials with a high level of technological maturity and finally qualify them for use in space applications⁷. **The resilience of the European space supply chain should include the capacity of the industry to recover from any disruption, especially disruptions in non-EU markets.** Currently, many critical materials are procured outside from Europe (from rare metals to silicones or fibres). The market demand for space-grade materials in Europe is so small that only institutional funding could help sustain it;
- There is indeed today no single platform which can focus on all aspects of the supply chain criticality; **one possibility could be to set up Important Projects of Common Interest (IPCEI) for space or setting up an equivalent of EDIRPA for space materials/technologies.**
 - In this respect, space missions, similarly, to defence, have sometimes significant number or requirements, one of them being high reliability, eliminating the risk of failure with fatal consequences. Therefore, good alignment between space and defence exemptions in EU's environmental regulations and protection of material and chemical sourcing and thereof of their use in Europe is essential, especially in the case of EU strategic space projects.

Finally, regarding partnerships or interoperability outside the EU framework, **very much needed**, it will be of course key to ensure that they do not risk to undermine **European sovereignty and autonomy**, with reciprocity and mutual benefits as common rules.

5) Towards a greener ecosystem

Beyond the critical role played by space-based services in the fight against climate change and for environmental protection, the question of the environmental impact of the space ecosystem itself is becoming essential. Although the impact of the sector is currently marginal with regards to global human activity, the volume of satellites and launches will keep on increasing and therefore mitigation plans have to be designed. The European space industry is currently mobilised to contribute to the global effort, and acknowledges the targets defined in the EU Green Deal: reducing EU emissions by at least 55% by 2030 and making the EU climate neutral by 2050.

Because of the specificities of the space sector, **effective mitigation plans will require taking a holistic approach**, encompassing the complete lifecycle of products. Specifically:

- Supply of raw material and products;
- Manufacturing of spacecrafts and launchers;
- Launches (with and without reusability);
- Ground infrastructures;
- End of Life of products.

Europe, thanks to its regulatory corpus already has an edge over its competitors on the global market regarding environmental performance (see also Annex 2 regarding chemical regulations). This edge is however fragile and needs to be consolidated with the support of the EU, through the following dimensions:

- **Fostering the sharing of environmental impact data** among actors along the value chain, as well as tools to assess impacts in a just and harmonised way;

⁷ Every spacecraft needs roughly 2000 various material items and a few hundred space-verified manufacturing processes. Currently, the Materials and Processes Technology Board of the European Space Components Coordination (ESCC MPTB) tracks over 2700 individual substances which are being used in some form by the European space sector.

- **Aligning the regulations with the pace of the R&D** in order for the technology to be ready and not to create any unachievable expectations, leading to losses of competitiveness (especially on the external market);
- **Launching and supporting research initiatives aiming at better understanding and assessing the environmental impact of the space industry**, especially in its unique dimensions (high performance materials, high-altitude emissions from launches and re-entries – including satellites, end of life);
- **Directing funding on the development of technologies or products that reduce environmental impacts**;
- **Supporting companies with demonstrated sustainability policies and environmental trajectories** addressing all aspects of their activities;
- **Introducing bonus points in call for tenders** relating to sustainability at large (ESG).

6) Addressing the export markets: a key objective to promote European competitiveness

Considering that the **European space industry strongly relies on the commercial business and export sales**, a **stronger support from the EU institutions to actively promote European space industry offers on the open markets** should be a priority (in complement and good coordination with national efforts) and with the objective to **facilitate access to new markets** by the active promotion of European capabilities.

In the last few years, DG DEFIS brought support for the European space industry to make a difference on third countries markets.

Considered as a very positive first step, it could **pave the way for future initiatives**, perhaps at a higher political level, and could be complemented through a **better integration of space in the international relations of the EU**. This would suppose:

- A **deepened dialogue with the European space industry** for the Commission to be aware of the industrial capacities/expertise it can rely and on capitalise upon (e.g. well-established reputation in the development of local capacities, technology transfer);
- The **creation of a 'European label'**. It would imply a further involvement of EU delegations in providing advocacy for European solutions, opening doors and providing support with the local decision-making bodies;
- **Cooperation between different DG services around export opportunities** ranging from
 - **Political support** at higher level (e.g. at the level of a Commissioner);
 - **Awareness-raising campaigns** within the EU delegations and a more systematic involvement of the EU delegates;
 - **Support to training** in space-related activities within European industries or agencies;
 - Instrument to allow the European space industry to **initiate early contacts** with institutions of potential governmental customers.

Annex 1 - Setting the scene of the European space sector

Worldwide dynamics of a strategic sector

The space manufacturing industry, a strategic sector embedded in the larger aerospace and defence industry, designs, develops and builds space systems (launchers, spacecraft and the related professional ground segment) for public and private customers in Europe and across the Globe.

The space industry is at the higher end of an important value-added stream of commercial and public/strategic services. Space value-added services and their ground segment users (e.g. Copernicus, Galileo, Broadcast and broadband services, geo-information...) generate socio economic benefits and support the development of Europe.

The worldwide space sector is subject to dynamics that directly affect the European space sector (e.g. lack of sufficient institutional investments, hazards of commercial and exports markets). Today, the European space manufacturing industry is losing market shares on an increasingly contracted commercial and export market, despite the good performance of its satellite industry.

In order for Europe and its industry to answer those dynamics and bridge the gap with the other space-faring nations, it is of crucial importance that both the European public entities and the European space manufacturing industry jointly answer the various challenges (i.e. variations of the commercial market, non-dependence and security of supply, sustainability of space activities) that lies ahead.

Key characteristics of space markets worldwide

Space markets worldwide are today **characterised by two dynamics** which are conditioning the power of action of the European space manufacturing industry:

- Space markets worldwide are still mainly driven by **public investment (A)** despite the rise, in the recent years, of private satellite operators, the largest being now located in Europe (e.g. SES, Eutelsat, Inmarsat).
- Space markets worldwide are characterised as **captive markets (B)**
 - Space markets, due to various restrictions that fall within the ambit of several political, economic, social, and technological barriers are often not accessible at the same level to all suppliers.
 - It is the case in the USA, Russia, India and Japan where all institutional needs are exclusively served by their own national players, thus **making them benefit from a strong competitive advantage** and having a direct consequence for the European space industry on the export market.
 - But, while open markets represent 30% of the overall space market, the European space manufacturing industry manages to capture **about 37% of it**.⁸

Space budgets and institutional programmes: a European exception

Public entities worldwide are still today the main promoters of space activities. As a consequence, the space industry is **highly reliant on institutional programmes** and their associated financing which are of three types:

- Public investment via the **financing of research and development programmes.**
 - This is the case with the EU Framework Programmes for Research and Technological Development to support and foster research in the European Research Area or with the Department of Defense (DoD) in the USA.

⁸ Eurospace internal measurement

- Public investment via the **purchase of space products and services** (e.g. the Galileo constellation).
 - In this case, public entities are the direct customers of the space industry.
- Public investment via **anchor tenancy contracts for the promotion of space services** (e.g. the NASA CCTS contract).

The European institutional market is growing each year thanks to demands coming from ESA, the European Commission and the military institutions. Indeed:

- Sales to ESA worth 3,6 M€, also supported by the budgets delegated from the EU (i.e. 607M€ in 2022).
- Sales to the European Commission (including revenues from grants such as Horizon Europe and from direct procurements managed by EUSPA) are growing fast with a steady increase
- National programmes, civil and military institutions sales are participating to a large amount to the European institutional market demand.

Focus: Sales to European institutional customers by procuring entity (M€)

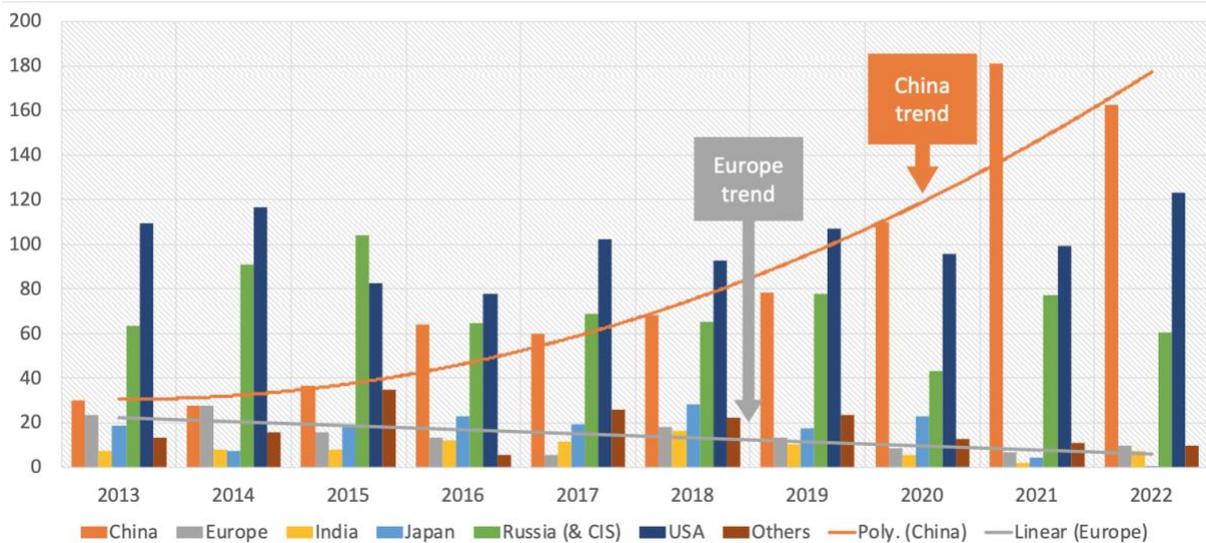


Source: Eurospace Facts&Figures 2023

If the investments made by European public entities have increased in the recent years, **they are, compared to the other space powers, relatively modest:**

- According to usual sources, the European institutional budget in 2020 is in the order of 10B€. It represents 6 to 7 less than in the US and in China.
 - China by the sheer impact of its institutional programme, active in all segments of military and civil space applications, science and exploration, and with a full suite of launch systems addressing all segments of launch requirements was able to launch more than 160 tons to orbit in the year
 - The USA, by the impressive record of activity of SpaceX relentlessly deploying the Starlink constellation (1722 satellites launched in 2022 for the constellation), and achieving every year a new record in cadence and reliability for the Falcon system (with 59 launches in 2022).

Institutional SC demand – all missions
total mass launched in 2012-2021 by customer region (tons) – public customers



This unequal situation de facto creates a **huge capability and technology gap between Europe and its direct competitors on the commercial and export market.**

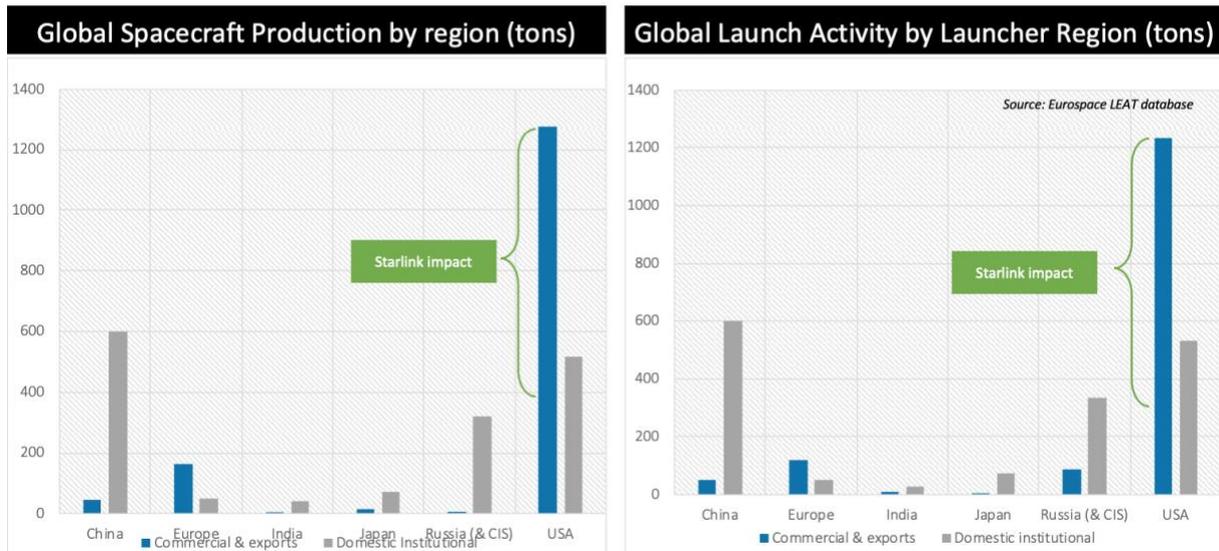
A strong exposure of the European actors to commercial and export markets

Because of the unequal situation highlighted above, the European space industry is **compelled to be very active on the very small segment of open and export markets**, characterised by hazards and competition, to maintain its competitiveness.

The largest spacecraft production capabilities are located in the USA and in Russia, followed by Europe and China. but these industrial sectors worldwide are not exposed to the same market dynamics.

- The Chinese, Russian, and Japanese industries are mostly serving a captive domestic demand
- The European and US industries are also competing on the global open market.
 - However, **the captive market represents a lower volume of activity than the open market for Europe only.**
 - As a whole, **Europe position accounts for approximately 30% (in volume) of the overall space open market.**

Space industry exposure to open & captive market segments in 2018-2022



As a result, it makes it more challenging for the European space manufacturing industry to sustain its current level of excellence since the exposure to the hazards of commercial markets is much more important than for the other space powers which benefit from large volume orders on the captive market allowing to apply low price offers on the export market, thus creating a non-level playing field.

The European space manufacturing industry only accounts for 57510 Full Time Employees (FTEs) in Europe. It represents 5% of the global industrial workforce.

The high leverage effect on EU global trade of the European satellite industry

Europe confirms its excellent position on the space systems export markets. Eurospace monitored the value of space systems export/import in the past decade and found that space systems exports.

The European space industry in 2022 represented 10B\$ in the spacecraft segment, and 6B\$ in the launcher segment, generating a net surplus to the European trade balance worth 900M\$ every year in the past decade.

This positive impact would be much higher if Europe was not the first destination for US satellite exports. Space systems imports not only reduce the positive impact of our exports on the trade balance, but they also diminish the local business opportunities for European space systems suppliers. If European customers, in particular on the institutional segment, applied an unfailing European preference, the European space industry would register close to one billion of additional revenues every year, and could support more than 6000 additional jobs.

Annex 2 – Navigating through European resilience with regard to materials and processes

It is of high importance for companies in the European Space Sector and their industrial partners to be compliant with EU environmental regulations such as REACH (Regulation (EC) No 1907/2006). The Materials and Processes Technology Board of the European Space Components Coordination (ESCC MPTB) has been addressing the impact of these regulations (importantly EU REACH) on space materials and processes for 15 years now. As a partnership between ESA, national space agencies (ASI, CNES, DLR), and the European space industry (formally represented by Eurospace), the ESCC MPTB is an effective sectorial monitoring and response framework to address new regulatory initiatives for the most harmful chemicals.

The increasing scope of regulatory initiatives, such as the wide-scope restriction proposal for per- and polyfluoroalkyl substances (PFAS) and the concurrent regulation of sustainability aspects beyond chemical safety (such as the Sustainable Products Initiative/Ecodesign for Sustainable Products Regulation “ESPR”) present big challenges and concerns for the space sector, with regard to the continued availability of critical materials and processes and our global competitiveness.

The precise legal requirements are often complex, not clear and sometimes inappropriate for space products (e.g. SCIP notification including for products which do not result in waste for treatment on Earth/in EU, therefore not being part of the Circular Economy⁹). Furthermore, a number of important aspects (such as the guarantee of technical performance in extreme conditions, economic feasibility, long-term planning while facing shorter term regulatory constraints) have to be conciliated.

Substances to be phased out under EU REACH authorisation and restriction initiatives are often key technology enablers for space applications, and consequently there is frequently a lack of alternatives to their use of. Recent analyses have been made for PFAS¹⁰ and lead metal¹¹. The impact is not limited to specific uses, but spreads across a myriad of applications in different space systems. Space companies are not able to solve these challenges alone, but are dependent on their suppliers and resources to be available for substitution R&D. As a small volume sector, space is also very vulnerable to commercial obsolescence in these cases, where critical materials are withdrawn from the market by suppliers due to the lack of profitability/high costs.

- Therefore, there is a need for proportionate regulation with prior impact assessments and upfront exclusions for essential uses from EU REACH authorisation and restrictions¹². Space specificities (such as very confined use inside controlled areas, closed systems and outer space outside Earth) should be taken into account – and harmonised - consistently across different pieces of EU environmental legislation.

In order to track substances of concern in chemicals supplied more reliably, the EU could establish dedicated tools such as a centralised database for safety data sheets (SDS), which could be supported by an electronic format for SDSs (as considered by COM under the on-going REACH Revision) with suitable application programmable interface (API) accessible to anyone (this would also benefit SMEs in particular). In addition, more exchanges with DG DEFIS and better predictability of upcoming regulatory initiatives and next steps (providing enough time for industrial input) are needed.

⁹ Eurospace Best-Practice Guidance of 19 September 2022, ref. MPTB-ES-GD-0110, available [here](#)

¹⁰ MPTB-ES-PO-0131 of 22.9.2023 available [here](#)

¹¹ MPTB-ES-PO-0099 available [here](#)

¹² MPTB-ES-PO-0098 available [here](#) and MPTB-ES-PO-0105 available [here](#)

In order to achieve a more sustainable aerospace and defence ecosystem, the following examples for materials/substances to be prioritised are the following:

- Green organic materials (such as adhesives, conformal coatings, paints) in the case of restrictions of harmful chemicals in the whole production chain;
- Sustainable and eco-friendly epoxies (for the creation of Carbon Fibre Reinforced Polymers (CFRPs));
- Raw materials (such as carbon fibers, space-grade polyimide films);
- Development of quantum-to-macro chemistry models to predict material properties at all levels, which would reduce test time, costs, risks, and emissions.

From an obsolescence management perspective, any material and associated process without viable alternative for launcher and spacecraft production, where there is a risk of unavailability according to the proactive obsolescence management approach in the European Space Sector (including but not limited to the activities of the ESCC MPTB and the ESA REACH Tool), should be addressed. Therefore, this would concern any technology where there is a risk of an export control restriction, such as:

- All aerospace-grade epoxies, silicones and polyurethane resins, polymer films such as polyimide, tapes, coatings, prepreg composite resins and fibers with production outside EU or with non-EU intellectual property rights associated with EU production;
- Metals which are used in the space business, but where the EU does not have sufficient manufacturing capacity, in size and volumes, or shapes manufactured. Non-exhaustive examples are steel, aluminium and titanium;
- Optical-quality LiBO crystals, pure inert gasses such as xenon, neon.

Finally, reflecting on EU REACH requirements, public funding should help mitigate issues for chemicals subjected to authorisation or restriction requirements. Examples include chromates such as chromium trioxide, lead and its compounds, bisphenols, and any substances included in EU REACH Annex XIV and/or Annex XVII, where there is a risk that they may no longer be available for space use.