INTERNATIONAL ASTRONAUTICAL FEDERATION



Global Industry Needs and Capabilities in a Shifting Space Market

An IAF Industry Relations Committee White paper

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Abstract

The global space sector is currently undergoing a structural transformation, where both government demand and commercial markets are reshaping in view of recent geopolitical developments and adapted market trends. Driven by a significant surge in both public and private budget allocations, this shift necessitates a fundamental realignment of industrial strategies and capabilities.

At a government level, the primary catalyst for the current market shift is the increase in sovereign defense spending, with global military space budgets now surpassing civil expenditures for the first time in decades. This calls for an adaptation of companies' products portfolios, development of new multi-layer, interoperable solutions for a quick entry into operations, as well as restructured industrial alliances and the formation of new ones. In the civil domain, ambitious plans for Moon bases and lunar research stations are opening up new horizons for commercial and scientific opportunities, driven by international cooperation and coordination. At the intersection of these opposite trends sit new space applications, such as orbital data centers and on-orbit servicing which leverage synergies with AI and computing industries, for both civil and military purposes.

This paper examines the critical needs and capabilities of the global space industry, emphasizing the demand for scalable manufacturing, resilient supply chains, and agile regulatory frameworks.

Introduction

The global space sector is undergoing a profound structural transformation. Driven by an unprecedented surge in both public and private budget allocations, industry is shifting from a low-volume, bespoke engineering ecosystem to a scaled, manufacturing-driven market.
While the United States has historically maintained a government spending model heavily weighted toward national security, the rest of the world is rapidly restructuring its space industries to mirror this paradigm in response to modern geopolitical realities.
To thrive, the space economy must evolve to function like other mature industrial sectors—prioritizing profitability, scalable manufacturing, and integrating resilient supply chains — while governments must foster cross-border collaboration rather than retreating into countryby-country silos.

1. The Dual Growth Engines: National Security and Civil Exploration

The current transformation is propelled by two distinct yet interconnected demand vectors: a geopolitical realignment of defense capabilities and an international expansion of civil exploration frameworks.

The Geopolitical Shift in Defense Spending

At a global level, the primary catalyst for the current market shift is a massive increase in sovereign defense spending, with global military space budgets surpassing civil expenditures for the first time in decades.

- **The US and China Baselines:** It is critical to note that US government spending has almost always been heavier on the national security side, a paradigm likely shared by China for some time.
- **The American Model of National Security Space:** The current shift represents a broader international trend in which other global militaries and space industries are reshaping themselves based on the American model. This includes adapting to advanced missile defense and situational awareness concepts such as "Golden Dome" architectures.
- **Industrial Adaptation:** This defense surge demands an immediate adaptation of companies' product portfolios. There is an urgent requirement for multi-layer, interoperable solutions designed for rapid deployment and quick entry into operations. The US national security enterprise is at the forefront of this new approach, overhauling its acquisition approaches with new expectations that companies will invest in new capabilities for operational insertion without long-lead government R&D programs.

The Civil Expansion: The Artemis Effect

While defense drives a significant portion of the market, civil space exploration remains a critical, non-defense anchor for global industry.

- **Artemis Accord Activities:** Changes and advancements in NASA's Artemis program are driving cascading modifications to the lunar activities of its partners under the Artemis program. New lunar architecture plans generate new technical and economic opportunities for the private sector.
- **Industrial Growth:** As civil space frameworks evolve, global industries must develop new international standards, interoperability requirements, and collaborative procurement models matching ambitious multi-national lunar and deep-space architectures.
- **International coordination and cooperation:** Given the technological, operational, and economical barriers of lunar activities, both countries and commercial actors have strong incentives to coordinate and cooperate for the success of everyone's efforts. Further to being prohibited on legal grounds (see Article IV, paragraph 2, of the Outer Space Treaty), the militarization of the Moon is both technologically infeasible (no actor has the capabilities to do it) and operationally disadvantageous (military contestation reduces market opportunities, undermines operational safety and further eliminates the legal certainty needed for business to thrive).

2. Regional Perspectives

The western hemisphere encompasses the incumbent spacefaring nations whose space capabilities have matured continuously since the mid-20th century. This institutional heritage has cultivated deep industrial bases capable of end-to-end mission design, manufacturing, and operational deployment. This paradigm has been historically symbolized by the United States and European sectors. Today, these established actors are navigating structural pivots as longstanding institutional procurement models adapt to aggressive commercial scaling and dynamic geopolitical and national security imperatives.

The United States Situation

Inspired by the last decade's growth by commercial space companies, the US government is increasingly demanding "commercial" sources of capability for both national security and civil uses. Capital markets have identified this demand and a wave of venture capital, private equity, and public market value has flowed into the sector. Potential customers and space companies are now working to align investments, development timelines, and specific technologies to new mission areas. The US space private sector thus faces acute pressure to rapidly transition from R&D and prototype-driven methodologies to high-rate, scalable manufacturing to meet the needs of both the Pentagon and expanding civil programs. Space companies are also working to identify and prove out commercial use cases for these technologies, to support their business cases outside of government demand and return investment on private capital timelines. This period of growth and transition is unprecedented and exciting, but will also be a test for the hundreds of startups entering the sector and for the US government to support the industry. The progress is steady, but experiences from early Commercial Lunar Payload Services (CLPS) Moon landings, for example, show that the transition to commercial services may still take some time.

The Europe Situation

Europe is navigating a more complex structural transition. Historically focused on commercial launch, science, and Earth observation, European industry is now racing to adapt to the global surge in military space demand. At the same time, European industry is undergoing a major transformation to adapt to new requirements and expectations from its core customers: European (and national) space programmes increasingly lean towards medium LEO constellations with sovereign functions and more funding from defence budgets.

The primary hurdle for Europe is political and structural fragmentation. To remain competitive with the US and China, European governments must actively work to support the industry in overcoming structural gaps. Europe is struggling to convert its existing capability into industrial performance. Development cycles are long, deployment is slow, and scaling remains limited. Overcoming these barriers requires aggressive industrial policy, targeted investment, and the active encouragement of cross-border collaboration. European stakeholders must resist the temptation to retreat into country-by-country industrial silos, which fragment supply chains and stifle market scaling.

The way forward is therefore not to redefine Europe's objectives, but to organise its existing assets into a more coherent and effective system.

The Asia-Pacific Situation

In contrast, the Eastern hemisphere and broader Asia-Pacific region have emerged as a highly dynamic, dual-engine growth corridor. Led by established space powers China and Japan, and rapidly expanded by India, South Korea, Australia, and emerging Southeast Asian nations, the region is actively developing sovereign ecosystems backed by multi-year national roadmaps. While the budgets vary in scale, the rapid growth in regional public spending, paired with increasingly commercialized and flexible procurement frameworks, has created an influential new frontier for international and domestic industry players delivering targeted sovereign solutions.

Apart from China and Japan, which have been key space sector players since the late 20th Century, India is executing a transformative industrial shift from a historically state-centric research paradigm toward a dynamic, market-driven NewSpace ecosystem. Now, India boasts a vital national program of scientific missions to the Moon and Mars, astronaut corps, multiple state-level space policies and centres of excellence, and various startups that are empowered by the Indian National Space Promotion and Authorisation Centre (IN-SPACe). National capabilities are also being driven for international export through NewSpace India Limited (NSIL) to become globally competitive in terms of price, schedules, and standardization.

The China Situation

China represents a distinct, state-integrated model in the current market shift: one in which sovereign national security priorities, centralized industrial policy, and a rapidly expanding domestic commercial space sector are tightly synchronized. Supported by long-term state planning and substantial capital deployment, China is scaling its launch infrastructure, heavylift capacity, and sovereign mega-constellations while establishing the parallel multinational networks such as the International Lunar Research Station (ILRS), Beidou Navigation Satellite System, and other projects under the Belt and Road Initiative (BRI). Its state and city-level funding of projects have built multiple dedicated space hubs across the country, most notably in Beijing, Shanghai, Wuhan, Hainan, and Shenzhen. Via access to domestic-only funding sources, Chinese industry is rapidly catching up to capacities once seen only in the U.S.

The Japan Situation

While historically focused on civil space and scientific exploration, Japan is increasingly integrating space capabilities into its national security and industrial strategy while maintaining its commitment to peaceful space development and multilateral partnerships. Japan's recent space security policies are now translating into concrete procurement programmes. Notably, the government has commissioned domestic industry to develop a sovereign satellite imagery constellation supporting stand-off defense capabilities, while investing in space domain

awareness, secure satellite communications and positioning systems. This provides industry with greater long-term visibility while reinforcing national autonomy.
Japan is also pursuing an active industrial policy through the Space Strategy Fund, supporting technology development in strategic fields and strengthening the competitiveness of its domestic space sector. However, commercial growth remains largely government-driven, with independent market creation and private investment still developing. As an original Artemis Accords partner, Japan continues to promote international cooperation, increasingly focusing on capacity building and interoperability with like-minded partners across the IndoPacific.

3. Technological Megatrends Driving Ecosystem Evolution

Cross-cutting the above geopolitical and investment trends are disruptive technology trends, which affect all segments of the space market. Rather than acting as isolated technology segments, AI and robotics are foundational drivers reshaping the broader space sector.

The Example of AI-Driven Edge Computing and On-Orbit Data Centers

The explosion of demand for data and computation driven by generative AI on Earth, paired with the national security and civil space imperatives to process space-derived data on-orbit, drives potential new use cases for space, namely orbital data centers. While many questions remain surrounding the physics and economics of operating data centers in Low Earth Orbit and beyond, the technological application is driving significant interest and investment in the sector.

On-Orbit Servicing (OOS)

On-orbit servicing is transforming the economic and strategic math of space operations across both domains.

- **Commercial and Civil Reshaping:** Economically, OOS acts as a powerful reshaping force by extending the operational lifespan of high-value assets, refueled satellites, and modular orbital infrastructure. It shifts the industry away from disposable architectures toward a sustainable, circular orbital economy.
- **National Security Dynamics:** From a security and defense perspective, on-orbit servicing capability introduces complex operational dimensions regarding space asset resilience, inspection, and situational awareness. Given the multilateral composition of global space committees, these capabilities must be developed within transparent, cooperative frameworks to ensure orbital safety and stability.

4. Impact on the Industrial Hierarchy: From LSIs to SMEs

The structural shift requires a fundamental realignment of industrial strategies across all tiers of the supply chain, forcing a restructure of traditional alliances. **Large System Integrators (LSIs)**

Large System Integrators are facing the disruption of their traditional business models. Historically optimized for low-volume, high-cost institutional contracts, LSIs must now pivot toward scalable manufacturing pipelines and profitable, volume-driven production.

- **Alliance Restructuring:** To rapidly acquire missing capabilities (such as mass software deployment or agile assembly techniques), LSIs are restructuring existing industrial alliances and forming entirely new ones.
- **Portfolio Adaptation:** LSIs bear the primary responsibility of integrating complex, multilayer technologies into unified, mission-ready architectures for sovereign clients.
- **Vertical Integration:** As integrators, LSIs have historically relied on deep supply chains and integrated parts from hundreds of sources. New players in the industry are increasingly vertically integrated, shaping new cost models, and where they are not integrated, volume production strains historical sources of supply.

Small and Medium Enterprises (SMEs)

SMEs and sub-tier suppliers represent the critical bedrock of the space industry, yet they are the most vulnerable to current market volatility.

- **Supply Chain Pressures:** The push for rapid scaling places immense stress on sub-tier component providers. Even more than LSIs, SMEs require resilient supply chains and predictable institutional demand to survive macroeconomic pressures and inflationary bottlenecks.
- **Integration into Global Ecosystems:** As the market shifts toward interoperability, SMEs can no longer build highly customized, siloed components. They must adapt their products to fit open architectures and international standards driven by large-scale defense frameworks.
- **The Need for Policy Support:** Because SMEs lack the capital reserves of LSIs, clear government industrial policies and cross-border collaboration are vital to ensure these smaller actors are not locked out of regional markets by protectionist silos.

5. Conclusions & Recommendations

The core implication of this evolving landscape is a mandate for both the private sector and sovereign institutions to modernize their operational philosophies. In short, the space economy must mature. The space sector can no longer operate as an insular, R&D-heavy enclave. It must transition to function like other mature, scaled, manufacturing-driven, and structurally profitable global industries.

To bridge the gap between current industrial capabilities and the surging demands of the market, governments must execute a double-pronged strategy:

1. Aggressive Industrial Policy & Investment: Provide clear, long-term budgetary visibility and modernized procurement frameworks that reward agile, scalable production rather than bureaucratic compliance.
2. Eradication of Country-by-Country Silos**:** Actively encourage cross-border collaboration and develop agile yet reliable regulatory frameworks. In an era of globalized threats and monumental exploration goals, retreating into national silos and purely geopoliticallydriven approaches will only fragment supply chains, drive up costs, and

paralyze industrial development. Opportunities may also be offered by emerging space markets (e.g., Latin America, South-East Asia) that can act as incubators for standards, service models, institutional partnerships and downstream applications.

3. Promotion of interoperability as a key market driver: fund and support global processes for the development of interoperability standards in key areas of future operations, particularly OOS and lunar activities, to increase resilience and promote the growth of opportunities for more B2B and B2C interactions in these environments.