IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Launch Vehicles in Service or in Development (1)

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ESA TECHNOLOGY STRATEGY TO SUPPORT THE SPACE TRANSPORTATION SECTOR IN EUROPE

Abstract

The space sector worldwide is rapidly moving towards more routinized space transportation, with a significant expansion of an emerging market for end-customer space-based services. This will bring structural changes into the space transportation sector in Europe, with a need for advanced technology developments.

In the past years, the space transportation sector worldwide has undergone a major change, with a strong-paced evolution of the market for launch services and an increasing prominence of commercial activities ranging from launch to in-orbit services and space-based ground services. Numerous new services and new technologies are being developed worldwide, leading to a diversification of the use of space, and requiring access to space for a wider range of payload classes, masses and orbits. In addition some of the commercial space-based services (e.g. constellations, micro-satellites) accept a higher risk-taking approach, thus aggressively seeking for cost effective launch services, involving newcomers in the launcher business with fast adoption of new technologies or benefiting from the reuse of launcher stages.

This overall context poses challenges to all actors in the space transportation sector, both traditional and new entrants. In Europe public activities appear as progressively increasing their share devoted to foster this structural change and to enable the emergence in Europe of innovative end-customer space-based services.

For what concerns the technology developments for the space transportation sector in Europe, the European Space Agency (ESA) is considering taking an enabler role in de-risking industry, eventually supporting future industry-led businesses and advanced technology developments, and by considering:
- Pursuing new technical solutions through rapid demonstration and frequent re-flight opportunities, to accelerate the qualification cycles on technology building blocks.
- Opening a modernised, cost-effective, increasingly versatile Europe's CSG Spaceport to answer to a variety of future new customer launching and landing needs.
- Stimulating innovation, growth and competitiveness through boosting space transport services led by new private European actors and associated emerging European ground infrastructure initiatives (e.g. spaceports).
- Preparing the space transportation building blocks enabling a potential future European Human Exploration.

With its role in de-risking industry, ESA plans to support the development of key and disruptive technologies, implementing a coordination at European level of technology developments for space transportation, with the following key drivers:
- Increase of launch services competitiveness in Europe by demonstrating reusability and enlarging the economies of scales trough modularity (increased commonality with elements re-use, higher production cadence...);
- Optimisation of the industrial organisation and systems interfaces (Agile approach, digitalisation, model-based system engineering, automated production...);
- Expansion of market capture for European space transportation beyond launch services, with mission extension modules seeking commonality across the fleet of European launchers (kick stages, in-orbit servicing modules, rideshares, exploration missions, experimentation and return to earth...).
- Environmentally sustainable launch services (reduce the environmental impact of spaceports, greener production of propellant, eco-designed future space transportation...).
- And support European autonomy to potentially engage in the future development of a European Human Space Transportation System, securing critical technologies related to man-rated space transportation systems (launch abort strategies, re-entry, off-nominal modes, crew module...).

This paper will address the ESA Technology Strategy to support the Space Transportation Sector in Europe.