

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Technologies for Future Space Transportation Systems (5)

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TECHNOLOGY ROADMAPS PREPARATION FOR EUROPEAN HYPERSONIC AND RE-ENTRY  
SPACE TRANSPORTATION SYSTEMS**Abstract**

Contrary to other major space-faring nations, Europe does not have access to space, but only limited experience associated with hypersonic, (re-)entry and landing vehicles on Earth and planets and/or on their moons with atmosphere. In the past few years, commercial private initiatives have developed and commercialised vehicles capable of missions including Earth re-entry and, even, partial re-usability. Europe is missing comparable initiatives, although some private developments of commercial character are now moving significant steps. In Europe new technological developments are still mainly left to government financed projects. In the field of controlled re-entry for manned transport, Europe is still at the beginning of the learning process. The mastering of technologies associated to hypersonic transportation and re-entry, both for robotic and human missions, is a mandatory requirement for Europe to remain competitive in the innovative and dynamic worldwide environment. For activities in Europe related to the specific area of reusable vehicles, many technologies have been demonstrated on ground. In addition, there is today an important momentum, at national and institutional level, on studying/developing demonstrators and/or experimental new vehicles and propulsion systems targeting different kinds of missions. These include vehicles and dedicated propulsion systems for suborbital and trans-atmospheric missions or for servicing LEO systems (spacecraft deployment and retrieval) and the ISS (supplies, experiments and transport of astronauts), as well as vehicles for human space exploration in large scale. On the basis of the European background and the expected evolution of the requirements and demands for the different mission scenarios, the conditions exist for ESA to coordinate in a unique roadmap, a set of activities for technology development and in-flight validation of hypersonic and re-entry space transportation systems. The paper focuses on the ongoing research activity being carried out by ESA with the Politecnico di Torino to elaborate technology roadmaps for European hypersonic re-entry space transportation systems, and the first results obtained so far are presented. First, the main settings of a database for hypersonic transportation and re-entry systems, based on the pillars for a Technology Roadmap are introduced. The second part of the paper presents the logical methodology used to derive, track and manage the previous pillars and consequently to derive the technology roadmaps. The paper concludes anticipating the following steps that will lead to the technology roadmaps preparation on the basis of the methodology described here.