

Technology Roadmaps for Space Exploration (09)  
Technology Development Concepts (2)

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SYSTEMS AND TECHNOLOGIES FOR SPACE EXPLORATION: STEPS - AN INITIATIVE OF THE  
PIEDMONT REGIONAL AUTHORITY, ACCADEMY AND INDUSTRY**Abstract**

Two and half years ago, Piedmont Region and Thales Alenia Space, together with Politecnico di Torino, University of Turin, University of Eastern Piedmont, ALTEC and 23 SMEs based in the region, started STEPS, an innovative collaborative project for accelerating the development of advanced technologies and promoting worldwide the technological excellence of our area. In these years, the STEPS project involved a considerable number of scientists and engineers, young and experts, in the space exploration topic globally recognized as essential for a sustainable development of nations. Thales Alenia Space Italia coordinates the overall project and the single work packages and directly contributes to research and develop solutions for Entry Descent and Landing, Virtual Reality and Collaborative Engineering, Surface mobility, Rendez-Vous and Docking, Protection from planetary environment, Thermal protection and control, Aerothermodynamics optimization, Inflatable structures, Shock absorbers, Health Management Systems, Commercial Transportation, Systems of Systems, Human-Machine Interfaces, Regenerative fuel cells. At the end of the project, scheduled for early 2012, a series of real and virtual demonstrators and technological areas will be presented showing how these technologies contribute to the creation of complex and advanced systems for robotic and manned space exploration missions. Currently, the project proceeds in both the research and technological development and in the implementation of the lander and pressurized rover demonstrators. The obtained and expected results already demonstrate the validity of the adopted approach and of many technical choices made during the project. In addition, the preparation of the engineering technological areas is ongoing and aimed at defining a new infrastructure for concurrent design, simulation and virtual reality, at reproducing the environmental conditions and soils typical of Moon and Mars, and at examining solutions for energy management, environmental control, new materials and structures, and robotic systems. The gained knowledge has already allowed the preparation of several proposals for advanced studies and projects, and promises interesting industrial perspectives and opportunities for all the companies involved in the project also through the participation in several international conferences. The project is observed by different key players of the space sector including ESA, which appreciated the quality of technical contents and the potentials of the adopted innovation model based on an open and dynamic collaboration. The paper describes the structure and organisation of the STEP project and reports the current status of the program.