

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Engineering - Methods, Processes and Tools (1) (4A)

Author: Prof. Nicole Viola
Politecnico di Torino, Italy

Ms. Sara Cresto Aleina
Politecnico di Torino, Italy

Dr. Roberta Fusaro
Politecnico di Torino, Italy

Ms. Valeria Vercella
Politecnico di Torino, Italy

Mr. Giorgio Saccoccia
European Space Agency (ESA), The Netherlands

SPACE SYSTEMS ENGINEERING TOOLS FOR TECHNOLOGY ROADMAPPING ACTIVITIES:
TRIS, TECHNOLOGY ROADMAPPING STRATEGY, AND HYDAT, DATABASE ON HYPERSONIC
TRANSPORTATION SYSTEMS

Abstract

A technology roadmap is the output of the technology roadmapping process, a complex and continuously evolving process, which aims at selecting technologies, mission concepts, capabilities and building blocks to pursue incremental paths to increase the Technology Readiness Level, according to specific strategic plans. Technology roadmaps are crucial not only to illustrate the technologies' procurement plan for specific missions in the future, but also the achievement for Europe of technological milestones enabling operational capabilities, essential for current and future space missions. Coordination of requirements and funding sources among all European stakeholders (ESA, EU, National Agencies, Industries) is one of the objectives of technology roadmaps. The paper presents the results of a research activity carried out by Politecnico di Torino in support to the work on-going at ESA to elaborate technology roadmaps for the hypersonic and (re-)entry space transportation systems' domain. Traditionally the approach has always been based on workshops and brainstorming. The idea at the basis of the research activity has been the development of a flexible and rational methodology to generate technology roadmaps to better support strategic decisions in combination with traditional methods. The research activity thus focuses on the development of an innovative methodology to derive, track and manage the technology roadmaps' basic pillars (Technology Areas, Operational Capabilities, Mission Concepts and Building Blocks) and on the implementation of the methodology itself into two ad-hoc tools: TRIS, Technology Roadmapping Strategy, and HyDAT, Database on Hypersonic and (re-)entry transportation systems. TRIS is a versatile software tool that implements the objective methodology for technology roadmaps' derivation and update. HyDAT is a smart database, able to collect, categorize and analyze data to support technology roadmaps for (re-)entry missions and reusability applications. In addition, HyDAT can support hypersonic and (re-)entry conceptual design activities. First, the paper describes the main settings of the database that manages all relevant initiatives for technological development of hypersonic and (re-)entry systems, categorizing them according to the roadmap pillars. Secondly, the paper presents TRIS, the tool used to derive, track and manage the pillars and consequently to generate the technology roadmaps. Eventually, the paper presents and discusses the results obtained by the application of HyDAT and TRIS to IXV (Intermediate eXperimental Vehicle), analyzing main activities expected in the near and far future to enhance hypersonic and (re-)entry technologies and proposing a TRL increase path in terms of missions

and activities to perform, and in which schedule to carry out them.