45th STUDENT CONFERENCE (E2)
Student Conference - Part 1 (1)

Author: Ms. Sara Cresto Aleina
Politecnico di Torino, Italy

Ms. Elena Mozzetti Monterumici
Politecnico di Torino, Italy

OPTIMIZED METHODOLOGY FOR TECHNOLOGY ROADMAPS DEFINITION AND UPDATE FOR SPACE SYSTEMS IN A SYSTEM OF SYSTEMS ARCHITECTURE

Abstract

Recently, an increased market competition has brought technology and innovation management to the centre of decision-making processes aimed at understanding the relationships between technological capabilities and objectives to reach. In addition, according to international roadmaps, aerospace systems' design has increased in complexity in the last decades to answer to market and stakeholders' needs and to face with an increased synergy between projects. This scenario has led to the need of analysing a higher level of systems' architecture: the System of Systems (SoS) architecture, in which systems are able to cooperate maintaining their operational and management independence. Successfully designing a SoS means being able to overcome organizational boundaries to establish a set of objectives and strategic plans. For these reasons, it has become more compelling to apply global, integrated approaches from the very early steps and all over the design process. A useful tool to monitor the current technological maturation and support decision makers is the technology roadmap. A technology roadmap is the output of a process aimed at identifying and managing technologies, mission, capabilities and systems according to specific strategic plans. This is a complex process, that considers many disciplines and parameters at the same time and that has to be included until the early steps of every optimized design process. Looking at the huge number of parameters to be considered simultaneously, a methodology for technology roadmaps derivation and update has been studied to assist decision makers in identifying a global optimal solution, also considering that this optimum can be far from the results achieved through single-discipline optimizations. This paper explain the main features of the logical methodology, based on the combination of common System Engineering tools and processes with Decision Analysis tools and Project Management needs and theories, able to track and manage the technology roadmap pillars and their features between different projects. In particular, this paper aims at giving a clear view of the challenges and the key difficulties that have to be overcame to size correctly the optimal technology roadmap according to a set of identified disciplines, showing the way they are involved and quantifying the importance of their involvement for the design and manage of SoS architecture. Using as an example a simplified Space Exploration context, studies will be proposed to size the results according to the SoS architecture features and requirements and to verify their accurate application within the methodology.