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Politecnico di Torino, ItalyFROM THE STAKEHOLDERS ANALYSIS TO THE MISSION CONCEPT SELECTION. AN AGILE
SYSTEM ENGINEERING APPROACH FOR THE DESIGN OF A SUBORBITAL TOURISTIC OR
SCIENTIFIC MISSION.**Abstract**

This paper proposes an agile system engineering methodology for the mission concept selection phase, providing, as a case study, the design of a suborbital mission able to make few flight participants (touristic passengers or astronauts) experience a microgravity period, reaching a target altitude of 100 km. The proposed methodology can be considered as an application of an agile system engineering approach, the most recent trend in the field of system engineering. Indeed, Agile SE methodologies focus on carefully exploring the design alternatives delaying the “freezing point” as long as possible, as long as information becomes available during the following steps of the product development. In this context, the paper suggests a procedure aimed at the generation of the highest possible number of feasible mission concept options avoiding high-level hasten decisions. Among these mission concepts, the design team and the stakeholders can jointly select the most appropriate strategies to reach the objectives that have been fixed at the beginning of the process. It is worth highlighting that choices performed at the very beginning of the product development deeply affect not only the design activity but have relevant implications on costs, timeline and product development strategy. Space missions are clear examples of systems with a high-level of complexity whose costs and time development are deeply affected by choices at system of systems level. The approach that is proposed in this paper starts with the identification of stakeholders and the careful analysis of their needs. In particular, it proposes a rational and logic way to manage the first qualitative and uncertain information, typically derived from interviews or talks, and to create a first list of mission requirements and constraints. Particular attention shall be devoted to the identification of hidden mission objectives, usually stakeholder unexpressed desires. Indeed, all these aspects become very important in all those cases in which non-technical stakeholders are involved. Then, in order to select the solutions, which are able to optimize the stakeholders’ objectives, the paper addresses suggestions to perform the trade-off analysis, proposing a list of typical technical areas among which it is convenient to select the most influent parameters, usually defined as key drivers. In the end of the paper, suitable mathematical cost functions are proposed and the option with the highest score will be selected for the following development stages.