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THALES ALENIA SPACE CONTRIBUTION TO HUMAN SPACE FLIGHTS: FROM INTERNATIONAL SPACE STATION ASSEMBLY TO LOGISTIC RESUPPLY

Abstract

Thales Alenia Space-Italy (TAS-I) played and still plays a key role in the design and development of the overall International Space Station and in its Sustaining. The involvement has been focused on various typologies of elements: logistics elements, starting from MPLM, going to ATV and now to commercial logistics like Cygnus PCM, laboratory like Columbus and its payloads, storage element like PMM, interconnecting elements like the Nodes with all the aspects associated to resource management and distribution, but also to the housing of the crew quarters and most of the advanced ECLSS and crew exercise racks, a unique element as Cupola. With the exception of Columbus, TASI role is primary for the integration of these elements to the ISS. The objective of this paper is to provide an high level overview of the experiences achieved in developing most of the functionalities needed for Human Space Flight thanks to various typologies of modules, it also provides lessons learned and evolution coming from experience of permanent module transferred from Columbus to the Nodes and also to PMM, from logistics underlying differences and lessons learned from MPLM, to ATV till PCM (even if not flown yet). TAS-I involvement in the sustaining engineering of all these elements allowed also to perform a mission evaluation and to compare expected behaviour versus data/information derived from real utilization. This allowed to derive several lessons learned, but in particular to better understand the on orbit needs and the associated requirements. The involvement in ISS programs for more than 20 years allowed also to build up an effective process to face new challenges, in terms of time to built a new pressurized element, to assembly it and to test it up to a configuration almost ready for flight. The paper will address changes in time, requirements and external conditions and their management in these 20 years. Finally the paper will address how these experience allows to built up "evolution projects" for future and more challenging missions towards deep space.