SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Space Exploration Education (5)

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MAIN RESULTS OF A "EUROPEAN CIS-LUNAR INTERPLANETARY PORT FOR SPACE EXPLORATION" PROJECT WORK ACTIVITY 2007-2008

Abstract

The third edition of the Post Graduate International Master in Space Exploration and Development Systems "SEEDS" started in November 2007 and was completed in December 2008. The Master program comprises two different steps:

- an initial "Learning Phase", during which the Students attend courses with the aim of learning the fundamentals of space concepts and Space Systems Engineering Design;
- a "Project Work Phase", during which the Students carry out the conceptual design of space exploration mission.

Both the "Learning Phase" and the "Project Work Phase" pursue a multidisciplinary approach, where all specialized disciplines are blended together, to make the Students able to acquire the system view and then to accomplish the conceptual design, through the Systems Engineering approach, of a selected case-study, which in the third edition of the SEEDS Master was a Lunar Orbiting–Space Operation Centre, named ECLIPSE, European Cis-Lunar Interplanetary Port for Space Exploration. ECLIPSE was designed to be a Logistic Node, in close proximity to the Moon, supporting the traffic from Earth to the Moon and to remote destinations such as Mars. The distinguishing feature of the SEEDS Master is the Project Work, performed by all Students together under the supervision of academic and industrial Tutors, coordinated by the Education Project Manager. Main objective of the Project Work is to train the Students on the basic principles of the System Engineering Design through their applications on a project related to a specific space exploration mission. The Project Work of the third edition of the SEEDS Master included:

- a Preparatory Work, during which the Students focused on the investigations of the whys and wheres of space exploration, on the definition of the mission statement, mission objectives, mission scenarios and top level system requirements and then on the accomplishment of the top level functional analysis with the final result of the identification of the complete architecture of ECLIPSE;
- Conceptual Design activities in three different European sites (Toulouse, Bremen and Torino) to develop a limited number of building blocks identified during the Preparatory Work.

The paper focuses on the Preparatory Work, illustrating the whole mission scenario, and the complete architecture of ECLIPSE and gives an overview of the main results obtained by the implementation of the Systems Engineering Approach to the Conceptual Design of the case-study. The positive experience of the third year activities of SEEDS is brought to evidence and the lessons learned are discussed.