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CLEANSAT - COORDINATED APPROACH RESHAPING TECHNOLOGY DEVELOPMENT FOR  
SPACE

**Abstract**

Clean Sat's goal is the maturation of the technologies needed to achieve full compliance with Space Debris Mitigation requirements. In 2014, CleanSat called into action all three European Large System Integrators as well as equipment suppliers in order to develop technologies for space debris mitigation in a coordinated approach, avoiding duplication of activities and enabling optimal exploitation of the Agency's resources. This innovative approach will facilitate the integration of innovative technologies in the next generation of Low Earth Orbit platforms. The implementation approach that is proposed consists of the following phases: 1. Common specifications definition phase 2. Concurrent engineering phase 3. High priority technologies development phase 4. Implementation in LEO missions

Concurrent engineering phase Within the CleanSat approach, equipment suppliers, satellite integrators and ESA work concurrently to achieve harmonised requirements for future developments. The technical and programmatic feasibility of the building blocks is assessed through the definition of technological roadmaps. During the concurrent engineering phase in 2016, 28 building blocks were studied in one year.

Development Phase

The next step of CleanSat is to take the most promising building blocks and develop them to TRL 7 for implementation by the LSIs and ESA in future space missions. Given the existence of space debris requirements (in France, this is even a law), these technologies are needed quickly. The concurrent engineering phase has shown that coordinated approach (between LSIs, users and ESA) enabled 28 studies to be completed in one year. As such, for the future phase, the coordinated approach will be maintained.

The building blocks of high interest for development surround the following areas of the space debris requirements: passivation, design for demise, deorbiting systems. Examples of such building blocks are: demisable reaction wheels, demisable metallic tanks, SMA passivation valve, PCDU upgrade for solar array isolation, and a controlled reentry module including arcjets and an electronic pressure regulator.

This paper describes how a coordinate approach is used in CleanSat to fit with the specific needs of equipment and technology design and development. It also provides description of the technical solutions which will be developed in the next CleanSat phase.