

SPACE OPERATIONS SYMPOSIUM (B6)  
New Operations Concepts (2)

Author: Dr. Ivano Musso  
ALTEC Spa, Italy, ivano.musso@altec.space.it

Mr. Giovanni Martucci  
ALTEC Spa, Italy, giovanni.martucci@altec.space.it

Mr. Ruggero Veneri  
ALTEC Spa, Italy, ruggero.veneri@altec.space.it

Mr. Michele Martino  
ALTEC Spa, Italy, michele.martino@altec.space.it

Mr. Armando Ciampolini  
ALTEC Spa, Italy, armando.ciampolini@altec.space.it

## EFFECTIVENESS AND CASE STUDIES FOR MULTI PURPOSE REMOTE CONTROL CENTERS

**Abstract**

Starting from the experience acquired for Shuttle Multi Purpose Logistics Module and Columbus operations for the International Space Station, ALTEC is preparing to become a multi-purpose Space Support and Control Centre.

Against the usual approach of a specialized and centralized control centre the paper discusses the effectiveness of a network of multi-purpose remote centers which can compose a distributed infrastructure providing higher stability and cost reduction. Moreover the proposed approach implies a better diffusion and sharing of space knowledge with an enlargement of the possible technology return and dissemination to universities and enterprises.

Then authors provide the overview of the new studies ALTEC is performing to collect knowledge and models necessary to support and lead multi-purpose operations. In particular the following cases have been analyzed: the extended ISS missions, satellites operations, reentry capsule and planetary robots.

After having described the general architecture of the current ALTEC facility the paper highlights the needed tools and infrastructures to face, as remote control or support centre, the selected scenarios:

- Concerning ISS the paper describes activities and operations would benefit from experiences and solutions adopted for MPLM Shuttle missions and discussing differences and commonalities with the case of satellites' operations.
- ALTEC is studying MCC architecture for Earth atmospheric reentry capsule both for planetary and sample-return missions. In this case due to the high autonomy of such spacecraft the main attention must be paid toward the integration of standard telemetry processing systems. Moreover another important point is the definition of the most suitable communication chain among the control centers and the other external entities, examples will be provided.
- For what concerns planetary robotics the paper presents the last analysis necessary for the selection of available ground stations, both national and international, trying to define a versatile network usable for many mission profiles and describing possible constraints. Then connections and links with indoor and outdoor test facilities are discussed. Finally the paper analyzes operational concepts considering team composition and interactions proposing a possible configuration for a low-cost and versatile approach based on distributed systems.