

SPACE OPERATIONS SYMPOSIUM (B6)  
Human Spaceflight Operations Concept (1)

Author: Mr. Jesús Jiménez  
European Space Agency (ESA), The Netherlands

SUSTAINING ENGINEERING, MAINTENANCE AND LOGISTICS IN SUPPORT OF THE  
EUROPEAN CONTRIBUTION TO THE INTERNATIONAL SPACE STATION

**Abstract**

This paper presents the long term infrastructure that provides sustaining engineering and logistic services to support the operations of the European contributions to the ISS, along with the challenges that ESA and European contractors have faced in setting up that infrastructure. The essential part of the ESA's contribution to the ISS is the Columbus module, including the internal and external payload facilities. ESA also provides sustaining engineering to other ISS International Partners (IP) for those elements developed by ESA and delivered to the IP under barter agreement. The primary goal is to guarantee the availability of the Columbus infrastructure to the ESA and other IP customers for utilizing the ISS, in accordance with the ISS Increment requirements and objectives.

Engineering integration services are provided to the customers during the payload development phase. Users must comply with a set of interface requirements. They are guided in the definition and verification of the interfaces between the experiment and the Columbus system.

The ISS operations are performed in "incremental" steps. Increment integration services support the mission preparation. These services perform feasibility assessment and engineering compatibility analysis to confirm that the defined objectives can be supported. It also certifies that the activities can be safely executed, as foreseen in the planning.

Real time expert engineering support is provided to the flight control teams in support to operations. The Engineering Support Centres (ESC) support the Columbus Control Center (COL-CC). Expert engineering support for the Columbus payload facilities is provided through the User Support Operation Centres (USOC), responsible for the operations of the ESA utilization programme. The sustaining engineering supports the resolution of anomalies, with the primary objective of finding real time workarounds to continue operations safely. Anomalies that cannot be resolved in real time are transferred to the off-line teams for detailed troubleshooting and resolution.

The Logistic Services organises the maintenance planning and execution. They also coordinate the cargo integration of ESA items in ISS launch vehicles, by providing manifesting, cargo bench reviews and support to the users at the launch sites. The service arranges end-to-end transportation and ground logistics to the ESA ISS customers. The on-board inventory and stowage of ESA assets in the ISS is also managed by these services.

The European engineering and logistic services are provided by the Industrial Operator Team (IOT), under a single Exploitation Service Contract. This contract provides for a distributed infrastructure, under a single management, and consolidates the industrial resources, capabilities and expertise retained from the development programmes.