# METERON SUPVIS-E Big Picture Words

Overview

Future exploration missions might involve robots on the surface of celestial bodies remotely operated from orbit by astronauts who would be supported, in turn, by control centers on Earth. METERON's objective is to perform an in-orbit testing and validation of robotic and end-to-end operations strategies as well as communications concepts and technologies that could be used in such scenarios. The SDM experiment will help validate the software under real operational conditions and communications environment. You will provide valuable feedback on use of the onboard GUI, including the use of video for situational awareness.
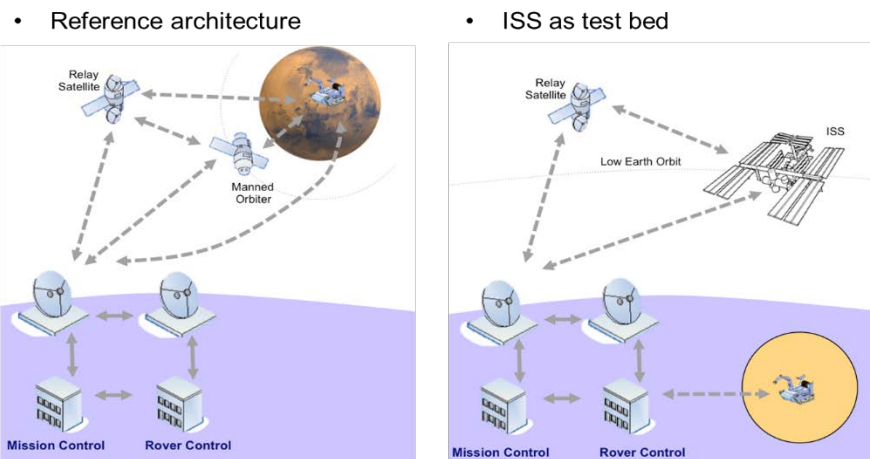
In particular, the Supervisory control of Eurobot (SUPVIS-E) is the third step of the METERON project, and will focus on validation of end-to-end operations concepts and technologies required for supervisory control of a rover from an orbiter, and collecting data for comparison with other robotic control modes. The Delay Tolerant Network (DTN) technology is used for the communication between the ISS and the rover. Such DTN connection uses automated store-and-forward techniques to compensate for the intermittent connectivity typical of space missions.

Left: Eurobot and Lander. Right: Eurobot and Surveyor Rover
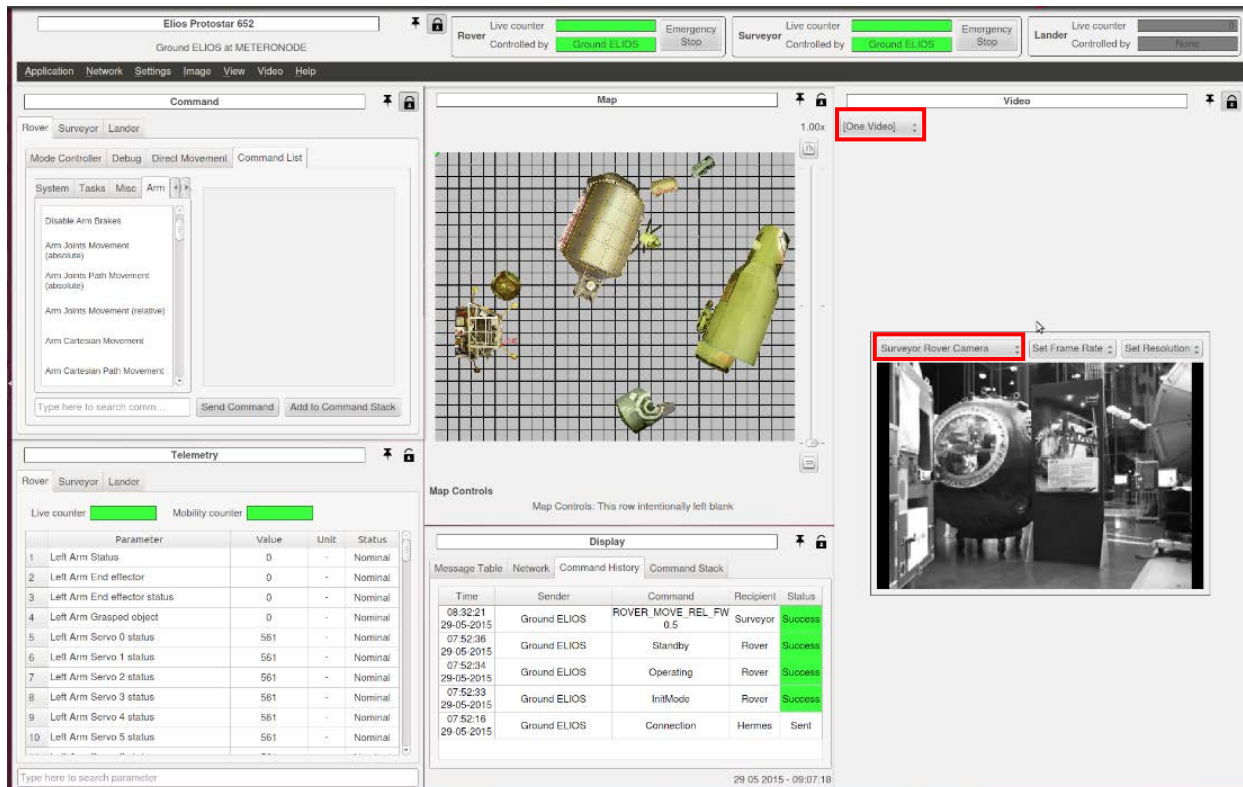
Operational scenario

SUPVIS-E involves tele-operations of the Eurobot rover located at ESTEC using the Rover Control Software (ELIOS) installed on the METERON laptops in Columbus. The rover will be instructed to execute a set of predefined activities on the Lander. A smaller, scouting Surveyor Rover will be used to provide extra views of the Eurobot activities. Video streams from the Eurobot, Surveyor Rover and Lander cameras will be available. The movements of the rovers will also be displayed on a map.

Both onboard laptops will have an instance of ELIOS running. ELIOS consists of different information screens called widgets. There are five different widgets: Command widget (for rover control); Telemetry widget (showing rover telemetry); Display widget (network status/command history); Map widget (visualizing the rover location - the map image can be zoomed in and out); Video widget (providing different camera views). The location of each widget can be adjusted.

One laptop will be used for rover commanding, viewing rover telemetry and a number of video streams, and the other computer to display a selected video stream.

You can select the amount of visible video streams and the camera view with the drop down list highlighted below. The default camera settings (frame rate and resolution) will apply.

ELIOS with all widgets active

Ground/Crew interactions & Dependencies

- Commanding during Ku-band LOS should be avoided. Please let ground know prior to the SUPVIS-E activity whether you would like a heads-up prior to each upcoming LOS.
- The activity will be closely followed via Columbus cabin video and crew calls will be used for status updates.

- At the steps in the procedure where you need to verify specific rover actions with video, you can call down for an alternative/better camera view. Ground can control the Lander camera (rotate/zoom) and Surveyor Rover camera.