

IAF SPACE OPERATIONS SYMPOSIUM (B6)
Mission Operations, Validation, Simulation and Training (3)

Author: Mr. Mathieu Schmitt
Space Applications Services, Belgium, mathieu.schmitt@spaceapplications.com

Mr. Nicolae Mihalache
Space Applications Services N.V./S.A, Belgium, nicolae.mihalache@spaceapplications.com

Mr. Fabian Diet
Space Applications Services N.V./S.A., Belgium, fabian.diet@spaceapplications.com

Dr. Julien Dufrey
Space Applications Services N.V./S.A, Belgium, julien.dufey@spaceapplications.com

OPEN SOURCE LEO MISSION CONTROL SYSTEM IS GOING FOR THE MOON

Abstract

This presentation aims to share with the Yamcs community the recent improvements brought to the open source code in the domain of simulation, training and key communication protocols allowing deep space missions, in the context of its deployment for a Moon mission.

Originally, Yamcs (which stands for “Yet Another Mission Control System”) was designed to complement the standard Mission Control System (MCS) at B.USOC for International Space Station (ISS) operations, and throughout the years an open source tool suite has been gradually added to offer a complete end-to-end Mission Control System solution. It remained loyal to its core values of being lightweight, scalable, reliable and open source.

Yamcs has been used in a variety of missions in Low Earth Orbit including the operations of a variety of ISS payloads and the monitoring of the European Robotic Arm.

In order to support operations for the moon, Yamcs has been even further extended to fulfil needs such as: deep space flight dynamics, space weather models, compatibility with the NASA cFS flight software and a range of key communication protocols to support NASA and ESA deep space ground stations.

Additionally a key enhancement for Yamcs described in the presentation is its integration with the simulator EuroSim, in order to support all phases of the mission. The presentation describes how Yamcs, in the context of the Moon mission, is providing a common ground system allowing to drive all the phases of the mission, from spacecraft assembly to routine operations. Yamcs is used to drive simulations during the development phase of the spacecraft, the integration of the spacecraft components, with a mix of software and hardware in the loop. The simulation capabilities are then leveraged for mission simulation and operators training.

The deployment of the updated Yamcs has been conducted starting in January 2019 and in 2020 will be used for two lunar missions.