

## **GSAW 2018 Tutorial K:**

CCSDS Mission Operations Services in a Nutshell

**Length:** Half day

### **Overview:**

The CCSDS Mission Operations Service are a set of new international standards for interoperability that brings significant benefits to those developing multi-Agency or distributed systems for mission operations. By standardizing the communication means and the information flow in the services, distributed and multi-Agency systems can be rapidly built and integrated, saving time and reducing cost. This tutorial provides a walk through the new services, and the technologies behind them, and how they can be used to support existing and future missions.

The first part of the tutorial is intended for anyone new to CCSDS Mission Operations (MO) Services. Its emphasis is more on the goals and benefits of MO rather than specific technical details. It will outline the fundamental issues that exist today and will walk the attendees through how MO solves these issues whilst supporting them in what they really wish to do. It will also cover the separation of the MO Framework from the MO Services. The aim of this part of the tutorial is that attendees feel that they have a good grasp on the goals and approach of MO and how it would fit in their world.

The second part of the tutorial will focus more on the Message Abstraction Layer and Common Object Model layers and on the specific functional services defined by MO. Discussions will cover the services intended usage and how they can be used together to facilitate operational needs. It will also cover other envisaged MO Services, such as Mission Data Product Distribution Service, Mission Planning and Scheduling Services, Automation Service, and File Management Service.

The aim of the training is that attendees leave feeling that they can see how the services fit together and how they could be used in, or to support, their needs.

**Instructors:** Mario Merri and Mehran Sarkarati, European Space Agency

### **Biographies:**

Dr. Merri is the Head of the Mission Data Systems Division at the Ground System Engineering Department of the European Space Agency, ESA. He holds three degrees in Electrical Engineering: the Laurea degree from the Politecnico di Milano, Milan, Italy, the Master and the Ph.D. degrees from the University of Rochester, Rochester, New York, USA. Since 1989, he is with ESA at the European Space Operations Centre in Darmstadt, Germany where he is responsible for the design, development, deployment, operation and maintenance of mission data systems for most ESA missions, this includes Mission Control Systems, Mission Planning Systems and Spacecraft Simulators. He is also responsible for Service Data Centres for the European Space Situational Awareness (SSA) Programme. Mario is very active in international standardisation, in particular within the Consultative Committee for Space Data Systems (CCSDS). He had been the chair of the Spacecraft Monitoring and Control Working Group, the home of the CCSDS Mission Operations (MO) Services, from the creation of the working group in 2003 until 2015. Currently, he is the director of the CCSDS Mission Operations and Information Management Services (MOIMS) area where the MO Services are being developed.

Dr. Sarkarati is Head of Application and Special Projects section at the Ground System Engineering department of ESA. He started his carrier at the European Space Agency, ESA, in 2004 at the European Space Technology and Research Centre in the Netherlands, moving in 2007 to European Space Operations Centre ESOC. During the last ten years, Mehran has worked on different subjects, including science planning for planetary space missions, simulations, monitoring and control systems for satellite and Robotics. Before joining ESA, he has worked on satellite attitude control systems and development of ground data systems at the German Aerospace Agency (DLR), Computer-Aided Design and assembly of jet engines at BMW Rolls-Royce Aero Engines and simulation of aircraft subsystem for Airbus A380 aircraft. Mehran is also very active in the standardisation domain. He is the chairman of the CCSDS Mission Planning and Scheduling Working Group and member of the CCSDS Spacecraft Monitoring and Control (SM&C) and Telerobotics working groups. Mehran has an interest in introducing modern engineering paradigms to the ground data systems domain and is promoting the adoption of CCSDS MO Services at ESA and with international partners.

**Description of Intended Students and Prerequisites:**

Basic space mission knowledge..

**What can Attendees Expect to Learn:**

- High level overview, goals, benefits and status of MO Services
- Detailed description of key technical properties and features of MO Services
- Introductory notions on how to use and orchestrate MO Services in real deployments