

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

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WEB-ENABLED RESPONSIVE SPACE OPERATIONS

Abstract

With notably few exceptions, space platform architectures are paired with mission specific ground infrastructures designed to optimize the interface. While these stovepipes are efficient within themselves, they don't allow for common user access, prioritization, multi-mission management, or cross platform connectivity. The U.S. Department of Defense (DoD), RD communities, and international disaster relief consortiums are interested in improving their ability to respond to rapidly evolving, transient phenomena via autonomous rapid reconfiguration. The ultimate end-state is to responsively assemble separate but collaborating sensors, sensor platforms, satellite operations service providers, data forecasting systems, and data analysis/fusion centers to allow the broader community to meet a wide range of mission and research needs efficiently and in real time. Today, there are several collaborative international efforts, including the International Charter – Space and Major Disasters, that pool together earth sensing satellites in order to provide critical imagery in support of global natural disasters. However, these efforts generally lack the ability to plan, track, or share information in a common environment. Responsive space operations need robust tools that can track current conditions, receive real-time requests, predict future mission capabilities, correct for limitations, and automate information flow. The Naval Research Laboratory (NRL) has developed a common, open-architecture, web-based application, called the Virtual Mission Operations Center (VMOC), that allows authorized satellite end users and operators to submit task requests, generate optimal schedules, and autonomously execute those tasks through satellite commands. The VMOC is not an experimental application, but an operational, accredited system, serving as the primary tasking tool for the U.S. DoD's Operationally Responsive Space (ORS) Office. It will be used exclusively for all payload tasking in support of two launches later this year, TacSat-4 and ORS-Sat1. VMOC was designed so that any, or all, of its suite of capabilities can be rapidly implemented with minimal impact to existing ground infrastructures, greatly improving responsiveness, providing shared situational awareness, and serving as a single, collaborative environment for all participants in the planning, scheduling, operating, and approving process. Additional capabilities and tools can be employed as familiarization and operational concepts evolve. This paper describes how VMOC operates and interfaces today, as well as proposes several potential constructs for VMOC employment into existing sensor and space-based architectures. It was jointly written by the Space Policy Institute (SPI), the DoD, and industry partners to highlight the collaborative VMOC development process and showcase the latest operations that are transforming spacecraft and ground interfaces.