

SpaceOps 2014 Abstract: Re-Engineering the ISS Payload Operations Control Center During Increased Utilization and Critical Onboard Events

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With an increase in the utilization and hours of payload operations being executed onboard the International Space Station (ISS), upgrading the NASA Marshall Space Flight Center (MSFC) Huntsville Operations Support Center (HOSC) ISS Payload Control Area (PCA) was essential to gaining efficiencies and assurance of current and future payload health and science return. PCA houses the Payload Operations Integration Center (POIC) responsible for the execution of all NASA payloads onboard the ISS. POIC Flight Controllers are responsible for the operation of voice, stowage, command, telemetry, video, power, thermal, and environmental control in support of ISS science experiments. The methodologies and execution of the PCA refurbishment were planned and performed within a four month period in order to assure uninterrupted operation of ISS payloads and minimal impacts to payload operations teams. To vacate the PCA, three additional HOSC control rooms were reconfigured to handle ISS real-time operations, Backup Control Center (BCC) to Mission Control in Houston, simulations, and testing functions.

This involved coordination and cooperation from teams of ISS operations controllers, multiple engineering and design disciplines, management, and construction companies performing an array of activities simultaneously and in sync delivering a final product with no issues that impacted the schedule. For each console operator discipline, studies of Information Technology (IT) tools and equipment layouts, ergonomics, and lines of sight were performed. Infusing some of the latest IT into the project was an essential goal in ensuring future growth and success of the ISS payload science returns. Engineering evaluations led to a state of the art media wall implementation and more efficient ethernet cabling distribution providing the latest products and the best solution for the POIC. These engineering innovations led to cost savings for the project.

Constraints involved in the management of the project included executing over 450 crew-hours of ISS real-time payload operations including a major onboard communications upgrade, SpaceX un-berth, a Soyuz launch, roll-out of ISS live video and interviews from the POIC, annual BCC certification and hurricane season, and ISS simulations and testing. Continuous ISS payload operations were possible during the PCA facility modifications with the reconfiguration of four control rooms and standup of two temporary control areas. Another major restriction to the project was an ongoing facility upgrade that included a NASA Headquarters mandated replacement of all electrical and mechanical systems and replacement of an external generator. These upgrades required a facility power outage during the PCA upgrades.

The project also encompassed console layout designs and ordering, amenities selections and ordering, excessing of old equipment, moves, disposal of old IT equipment, camera installations, facility tour re-schedules, and contract justifications. These were just some of the tasks needed for a successful project.

This paper describes the logistics and lessons learned in upgrading a control center capability in the middle of complex real-time operations. Combining the efficiencies of controller interaction and new technology infusion were prime drivers for this upgrade to handle the increased utilization of science research on ISS. The success of this project could not jeopardize the current operations while these facility upgrades occurred.