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Payload Operations Integration Process



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★ Payload Operations Integration Process

- ◆ Overall Goal:
 - ◆ Ensure that the crew and ground teams are adequately trained
 - ◆ Operational products are developed and integrated to promote successful on orbit operations
- ◆ Increment/Flight Payload Operations Integration processes and procedures are documented in the Payload Operations Handbook, Vol. 1. This document is available on the POIF website.
 - ◆ Go to the following site for instructions on acquiring an account:
<https://payloads1.msfc.nasa.gov/>
 - ★ Click on “Need an account”
 - ✧ Account Request Forms can be downloaded from this site
 - ✧ Fax the completed forms to 256-544-4781
 - ✧ Note: All non-NASA employees are required to have a NASA sponsor’s signature.



★ Payload Operations Integration Process

- ◆ Once the operations concept for the payload is well underway, the development of operations products and procedures can begin. POIF personnel will be assigned to assist each payload in the accomplishment of these tasks.
 - ◆ An Ops Lead will be assigned shortly after PIM assignment. The Ops Lead will support the Payload Developer in the areas of crew training, crew procedure development, as well as assist the Payload Developer in providing input to other operational products.
 - ◆ A Payload Activity Requirements Coordinator (PARC) will be assigned once the payload is baselined as part of a Research Directive and is assigned a target flight. The PARC will assist the Payload Developer in the development of detailed planning requirements for on orbit scheduling.



★ Payload Operations Integration Process

◆ Crew Training Process

- ◆ The Training Strategy Team (TST) Process will determine the requirements and implementation approach for training the crew.
 - ✦ The TST is organized and lead by the Ops Lead and is comprised of the Payload Developer (PD), JSC Astronaut Office Representative, Procedure Author (Ops Lead or PD), Payload Display Review Team (PDRT), and the Crew Training Coordinator (CTC).
 - ✦ Requirements for training hardware, lesson plans, and the development of any other products required to support the schedule for crew training are discussed, defined, and agreed to via the TST process.
 - ✧ Crew Training requirements are configuration managed by the NASA Payload Operations Control Board (NPOCB). The Ops Lead will enter and manage this data on behalf of the Payload Developer.
- ◆ The Payload Crew Training window is from I-18 months to I-2 months.



Payload Operations Integration Process

◆ Planning Process

- ◆ Pre-Increment Planning is performed by 2 positions:
 - ✦ Payload Activity Requirements Coordinator (PARC)
 - ✧ Primary interface with the PD during Increment/Flight Planning for resource/requirement collection
 - ✦ Payload Planning Manager (PPM)
 - ✧ Responsible for the development of the Integrated Payload On-Orbit Summary (OOS) and associated Ground Rules and Constraints (GRC)
- ◆ Payload activity requirements are collected in the User Requirement Collection (URC) tool
 - ✦ Includes resource requirements such as power, data, thermal, on orbit crew time for Earth to Orbit Vehicle (ETOV) and ISS.
 - ✦ Requirements are configuration managed by the NASA Payload Operations Control Board (NPOCB). The PARC will enter/collect and manage this data on behalf of the PD.
- ◆ The On-orbit Summary (OOS) is developed prior to the start of the Increment to lay out the payloads planned to operate during the Increment on a weekly basis.



★ Payload Operations Integration Process

◆ Flight Product Development

◆ Crew Operations Procedures

- ★ The Procedure Author may be a member of the Payload Developer Team or the POIF Ops Lead.
- ★ Traditional operations tasks/phases include installation, setup, operations, maintenance, and shut down. The operational concept and defined tasks are the foundation for the development of crew procedures.
 - ✧ ISS Crew Procedures are maintained and accessed electronically onboard the ISS.
 - ✧ Shuttle Crew Procedures are maintained and accessed in a paper format.
- ★ ISS Crew Procedures are configuration managed by the Payload Operations Data File Control Board (PODFCB).
- ★ Shuttle Crew Procedures are input to JSC/Mission Operations Directorate for configuration management.



★ Payload Operations Integration Process

◆ Flight Product Development (continued)

◆ Ground Command Procedures

- ★ These are step-by-step instructions for the POIF cadre to command, control, and monitor payloads and the ISS systems supporting payloads.
- ★ At a minimum, the POIF cadre must have the capability to issue commands to safe individual payloads. The payload may also delegate limited command operations to the POIC. Delegated command operations must be accompanied by a Payload Regulation authorizing the POIF to issue commands on the PD's behalf.
- ★ The Ground Command Procedures consist of a total of 7 volumes. Volume 3 contains the Payload Specific procedures.
- ★ The Ground Command Procedures are configuration managed by the Payload Operations Data File Control Board (PODFCB).



★ Payload Operations Integration Process

◆ Flight Product Development (continued)

◆ Flight Rules

- ✦ The primary objective is to provide guidelines to Flight Controllers to expedite decision-making in real-time situations.
- ✦ The PD is responsible for providing inputs relating to the overall management of the payload for off-nominal conditions that affect crew and/or vehicle safety.
- ✦ Flight Rules are developed and maintained under the authority of the Flight Director Office.

◆ Payload Regulations

- ✦ The primary objective is to provide established pre-planned responses to nominal or off-nominal situations, as well as any payload unique information that will allow the POIF cadre to respond immediately to particular operational situations that do not affect crew and/or vehicle safety.
- ✦ Payload Regulations are configuration managed by the NASA Payload Operations Control Board (NPOCB).



★ Payload Operations Integration Process

◆ Ground Support Team Training

◆ Payload Developer (PD) Team Training

- ★ The PD Team Training process is documented in the Payload Ground Support Personnel (GSP) Training and Certification Plan, Volume 3. This document is located on the POIF website.
- ★ The PD Team is responsible for identifying their real-time operations support team and the specific roles and responsibilities of each member of this team so that the associated training requirements can be identified.
 - ✧ PD Ground Support Team training will be addressed in the Training Strategy Team process.
- ★ The PD Team is responsible for providing training to their internal operations support team members. The training should include:
 - ✧ Recommend: Detailed knowledge of experiment/mission objectives, payload hardware, and payload operations.
 - ✧ Required: POIF Interfaces
 - ⊕ This training will be offered to all PD team members by POIF, or can be implemented via “train the trainer” philosophy.



★ Payload Operations Integration Process

◆ Ground Support Team Training (continued)

◆ Cadre/PD Simulations

- ✦ Generally conducted in the L-6 to L-3 timeframe. These simulations are specific to a given Increment or Flight.
- ✦ PD Team members participate in a manner consistent with how you plan to operate in real-time.
- ✦ Opportunity for the PD Team and POIF cadre to gain experience in nominal and off-nominal payload operations prior to flight.
- ✦ Opportunity for the PD Team to practice interfaces with the POIF cadre.



★ Payload Operations Integration Process

◆ Ground Data Services

◆ The Ground Support Requirements Team (GSRT) will process Payload Operations Integration Center (POIC) ground data service requirements from the Payload Integration Agreement (PIA) Letter and the Ground Data Service (GDS) Blank Book tables.

- ★ POIC services include commanding, video, telemetry/science data, payload health and status data, mission operations voice communications and information management services.
- ★ POIC services can be remotely accessed by the Payload teams
- ★ GDS Blank Book completed I-13 months
- ★ POIC Services Established I-8 months