

## Space Flight Operations Contract

---

# Product Development Plan for Program Integration Management Operations PDP MS-001

April 12, 2002  
Revision B

DRD-1.1.1.1-f

Contract NAS9-20000



**Product Development Plan  
for  
Program Integration Management  
Operations  
PDP MS-001**

April 12, 2002

Approved by



---

BOEING HUMAN SPACE FLIGHT & EXPLORATION  
Richard N. Richards  
Program Director, Shuttle & Space Station Integration

Approved by



---

USA  
H. Neal Hammond  
Vice President & Associate Program Manager,  
Program Integration

Approved by



---

NASA TMR  
Lambert D. Austin, Jr.  
Manager, Space Shuttle Systems Integration

DRD-1.1.1.1-f

Contract NAS9-20000

### REVISION LOG

REV LTR	CHANGE NO	DESCRIPTION	DATE
A B	Baseline	Revised to reflect transition to USA. Revised to satisfy internal management integration audit recommendations and to reflect program management operational changes.	06/12/97 04/17/98 04/12/02

**Product Development Plan  
for  
Program Integration Management  
Operations  
PDP MS-001**

LIST OF EFFECTIVE PAGES

April 12, 2002

The current status of all pages in this document is as shown below:

<u>Page No.</u>	<u>Change No.</u>	<u>Date</u>
i - iii	Rev. B	April 12, 2002
1 - 44	Rev. B	April 12, 2002

## **PREFACE**

This Product Development Plan for Program Integration Management Operations PDP MS-001 was prepared by United Space Alliance (USA) and Boeing.

The primary responsibility is with USA Program Integration.

Questions concerning the technical content of this document should be directed to USA, mail code USH-700A, Kim Wunsch, (281) 212-6211 or USA, mail code USH-700A, Neal Hammond, (281) 212-6184.

## TABLE OF CONTENTS

SECTION	PAGE
<b>1.0 SCOPE.....</b>	<b>1</b>
<b>2.0 DOCUMENTATION.....</b>	<b>8</b>
2.1 APPLICABLE DOCUMENTS .....	8
2.2 REFERENCE DOCUMENTS .....	10
<b>3.0 MANAGEMENT OPERATIONS TASKS .....</b>	<b>12</b>
3.1 MANAGEMENT ORGANIZATIONAL STRUCTURE .....	12
3.1.1 NASA JSC/MS/SPACE SHUTTLE SYSTEMS INTEGRATION OFFICE ....	12
3.1.2 NASA JSC/MT/SPACE SHUTTLE CUSTOMER AND FLIGHT INTEGRATION OFFICE .....	12
3.1.3 NASA KSC/MK-SIO/SPACE SHUTTLE KSC INTEGRATION OFFICE .....	13
3.1.4 NASA MSFC/MP/SPACE SHUTTLE PROJECTS OFFICE .....	13
3.1.5 NASA JSC/LM/RESOURCES MANAGEMENT OFFICE .....	13
3.1.6 USA SYSTEMS, CARGO, CUSTOMER AND FLIGHT INTEGRATION OFFICE .....	13
3.1.7 BOEING.....	14
3.1.8 INTERFACES .....	15
3.2 TECHNICAL MANAGEMENT .....	15
3.2.1 SSP REQUIREMENTS .....	15
3.2.2 CRITICAL MATH MODELS, TOOLS, AND DATABASES .....	16
3.2.3 CONFIGURATION MANAGEMENT OF PDPS .....	17
3.3 BUSINESS MANAGEMENT .....	18
3.3.1 ESTABLISHING A BASELINE PLAN .....	18
3.3.2 FINANCIAL AND RESOURCE MANAGEMENT .....	19
3.3.3 CHANGING THE BASELINE .....	19
3.4 PRODUCTS.....	19
3.5 PRODUCT ACCEPTANCE CRITERIA .....	20
3.6 ROLES AND RESPONSIBILITIES.....	20
3.7 IN-FAMILY/OUT-OF-FAMILY CONDITIONS .....	20
3.8 PROBLEM IDENTIFICATION AND RESOLUTION PROCESS.....	21
<b>4.0 CoFR ACCOUNTABILITIES.....</b>	<b>23</b>
<b>5.0 CONTINUOUS IMPROVEMENT .....</b>	<b>24</b>
<b>6.0 SURVEILLANCE .....</b>	<b>25</b>
<b>7.0 METRICS .....</b>	<b>26</b>

## TABLE OF CONTENTS

<b>APPENDIX</b>		<b>PAGE</b>
A	ACRONYMS AND ABBREVIATIONS.....	27
B	TASK PROCESS .....	31

### TABLE

3.1	PROGRAM AND SPACE STATION INTEGRATION MANAGEMENT INTERFACES.....	33
3.2	MANAGEMENT REVIEW FORUMS .....	35

### FIGURE

3-1	NASA JSC/MS/SPACE SHUTTLE SYSTEMS INTEGRATION OFFICE.....	37
3-2	NASA JSC/MT/SPACE SHUTTLE CUSTOMER AND FLIGHT INTEGRATION OFFICE .....	38
3-3	USA SYSTEMS, CARGO, CUSTOMER AND FLIGHT INTEGRATION OFFICE .....	39
3-4	BOEING SHUTTLE AND SPACE STATION INTEGRATION ORGANIZATION....	40
3-5	PROGRAM REQUIREMENTS CONTROL HIERARCHY .....	41
3-6	SYSTEMS, CARGO, CUSTOMER AND FLIGHT INTEGRATION MACRO/ PROCESS HIERARCHY .....	42
3-7	CONFIGURATION MANAGEMENT OF PDPS.....	43
3-8	PROBLEM IDENTIFICATION AND RESOLUTION PROCESS AND PROCEDURE INTEGRATED PROCESS SUMMARY .....	44

## **OVERVIEW**

This Product Development Plan (PDP) provides a characterization of the program and project management processes for the Systems and Cargo Integration, and Customer and Flight Integration portions of the NAS9-20000 Space Flight Operations Contract (SFOC) prime contract and associated subcontract for the National Aeronautics and Space Administration (NASA)/Johnson Space Center (JSC)/MS/Space Shuttle Systems Integration Technical Management Representative (TMR). These processes control the technical, schedule, and business management operations. The main focus of this PDP is on the management review and decision processes for Systems, Cargo, Customer and Flight Integration administered by NASA, United Space Alliance (USA) and Boeing.

This PDP describes the inputs and interfaces required to initiate and execute the management operations processes, appropriate review and decision forums, resultant products, and any applicable metrics and standards. The management operations described in this PDP provide:

- a. Technical direction and performance evaluation
- b. Problem Identification and Resolution Process (PIRP)
- c. Establishment and control of task priorities, schedules, and contract product deliverables
- d. Assurance of product quality, timeliness, and associated metrics visibility
- e. Management approval of changes to critical tools, models, databases, and associated processes
- f. Integration of multi-site task interfaces and project requirements
- g. Budget planning, control, and variance analysis

### **1.0 SCOPE**

This PDP has been prepared pursuant to Data Requirements Description (DRD) 1.1.1.1-f, Space Flight Operations Product Development Plans. This PDP characterizes the work efforts required for the management team to satisfy Systems, Cargo, Customer and Flight Integration requirements for the NASA/JSC/MS/Space Shuttle Systems Integration TMR. This PDP contains sections describing the following:

- a. Management organizations
- b. Management operations processes
- c. Resultant products
- d. Product acceptance criteria
- e. Roles and responsibilities for management oversight and insight

- f. Approach to in-family and out-of-family conditions
- g. Certificate of Flight Readiness (CoFR) accountabilities
- h. Continuous Improvement (CI)
- i. Surveillance
- j. Metrics

The specific tasks covered by this PDP are included in the following table.

<b>PDP Section</b>	<b>SFOC SOW</b>	<b>NAS9-20000 WBS</b>	<b>Task Title</b>
3.13.1	1.1.1	1.2.5.1	Technical Management
3.23.1	1.1.1	1.2.5.2	Management Support
3.43.1	1.1.2.1	1.1.2.1	Financial and Resource Management

The products identified by this PDP are shown below.

<b>NAS9-20000 DRD No.</b>	<b>Type</b>	<b>Product</b>
1.1.1.1-a	1	<u>Management Plan</u> - Describes the contractor's management organization, approach and systems.
1.1.1.1-b	1	<u>Work Breakdown Structure (WBS) and Dictionary</u> - Organizes the tasks to be accomplished in this contract in a product-oriented structure. The WBS and dictionary shall provide the framework for structuring the program implementation plans, establishing and tracking budgets, preparing schedules, developing work force and material estimates, preparing work authorization documents, and reporting contract performance.
1.1.1.1-g	3	<u>Organizational Breakdown Structure</u> - Identifies the contractor's organization for performing this contract.
1.1.1.1-k	3	<u>Notification of Significant Program Management Decisions</u> - The purpose of the DRD is to document potentially significant contractor program management decisions such that NASA program management will have timely and appropriate insight prior to their implementation.
1.1.2.1-c	3	<u>Facility Maintenance Cost</u> - Provides facilities maintenance cost data per NASA Headquarters direction and format.

<b>NAS9-20000 DRD No.</b>	<b>Type</b>	<b>Product</b>
1.1.2.1-d	3	<u>Energy Utilization and Consumption Report</u> - Provides SFOC energy consumption, forecasts, and variance analysis for each responsible SFOC location on a monthly, quarterly, and annual basis.
1.1.2.2-b	1	<u>Performance Measurement System (PMS) Reports (Operations)</u> - Provides technical, cost, and schedule performance summary and assessment based on a PMS for all operation activities (i.e., non-development/non-production activities).
1.1.4.1-a	2	<u>Information Management Plan</u> - Provides a description of the contractor's information system.
1.1.4.1-b	1,3	<u>Information Technology (IT) Plan and Reports</u> - Documents the contractor's compliance with Federal and NASA IT planning and reporting regulations and requirements.
1.1.5.1	2	<u>Configuration Management Plan</u> - Describes the contractor's method for accomplishing the Configuration Management (CM) requirements of the contract.
1.1.5.2-a	2	<u>Verification Management Plan</u> - Describes the contractor's method for accomplishing the verification management requirements of the contract.
1.1.6.1-a Volume I	1	<u>SFOC Facility Management Plan</u> - Documents the contractors integrated processes for conducting facility management functions including facility projects, maintenance, sustaining engineering, space utilization, energy management, environmental management, subcontract management, real property reporting.
1.1.6.1-a Volume II	1	<u>SFOC Five-Year Facility Project Requirements Plan</u> - Provides the contractor's five-year facility project requirements plan including those above and below contract threshold for implementation.
1.1.6.1-b	1	<u>Facility Project Documentation</u> - Project documentation for SFOC facility projects providing for government authorization as well as insight into cost, schedule, and performance.
1.1.6.3-a		<u>Security Management Plan</u> - Describes how the plan will be used to define the SFOC security management task.

<b>NAS9-20000 DRD No.</b>	<b>Type</b>	<b>Product</b>
1.1.6.3-b		<u>Technology Protection Control Plan</u> - Describes how the plan will be used to define the SFOC technology protection mechanisms for all SSP development and operations activities.
1.1.7-a	1,2,3	<u>Manifest Products</u> - Defines the manifest and top-level program schedule products to support the Space Shuttle Program Office.
1.1.7-d	1	<u>Flight-Specific TV Plan</u> - The flight-specific TV Plan documents the timeline, configuration and operation requirements necessary to satisfy planned video and audio events. Test and operation of new technology/capabilities are also included.
1.1.7-f	1	<u>Flight Requirements Documents (FRDs)</u> - Documents Space Shuttle Program (SSP) authorized requirements for each flight. The FRD Blank Book is used as a guide during preparation of the flight-specific FRDs. Implementation of the specifications defined within the FRD Blank Book ensures a consistent definition and format for flight requirements. The FRD International Space Station (ISS) Standard contains the Program Requirements Control Board (PRCB) approved requirements for a standardized ISS flight and is used for the preparation of the flight-specific FRDs for Space Shuttle flights to the ISS.
1.2.1.1-a	1	<u>Flight-Derived Dispersions and Database Update</u> - Provides statistically reconstructed flight data for preflight analyses that require flight-derived dispersions.
1.2.1.3-a	3	<u>Mission-Specific Shuttle Thermal and Structural Math Models</u> - Models are required as input data for analyses of specific Space Shuttle payloads and cargo configurations.
1.2.1.3-b	3	<u>Cargo Thermal and Loads Verification Analysis</u> - Provides passive and active/Environmental Control and Life Support System (ECLSS) thermal verification analyses or assessments for every Space Shuttle mission payload/cargo configuration for the planned mission timeline; structural dynamic loads verification analysis for every Space Shuttle mission payload/cargo configuration; and analyses used by payloads for verification of Shuttle compatibility.

<b>NAS9-20000 DRD No.</b>	<b>Type</b>	<b>Product</b>
1.2.1.3-c	3	<u>Safety Evaluation of Orbiter Services for Payload Use</u> - Safety evaluations of payload planned use of Orbiter-provided services to identify possible payload-to-Orbiter interface hazards. The evaluations are based on payload customer Safety Assessment Reports and are used by the cargo engineering member of the Payload Safety Review Panel.
1.2.1.3-d	3	<u>Payload Environment Impact Statement</u> - The payload complement for each Shuttle mission is assessed for potential environmental impact to the Earth's atmosphere or population. This evaluation supports NASA Headquarters' statements as listed in the Applicable Documents Section (13.2 of DRD 1.2.1.3d) regarding potentially adverse environmental impacts of each Shuttle space flight mission.
1.2.1.5-a	3	<u>SSP Drawing Release Change Request (CR)</u> - Authorizes release of the Space Shuttle systems drawings for each flight.
1.2.1.5-b	3	<u>Engineering Drawings</u> - Provides flight-specific cargo integration information necessary for contractor and payload customers to evaluate the compatibility of the flight cargo mix with the designated Orbiter. To provide the final cargo integration engineering drawings required for Orbiter reconfiguration.
1.2.1.6-a	1,3	<u>Day-of-Launch Support System (DOSS) Flight-Specific Products</u> - Provides flight-specific products to DOSS for assessment.
1.2.1.6-b	3	<u>DOSS Non Flight-Specific Products</u> - Supports periodic block updates for DOSS software databases.
1.2.1.7-a	3	<u>Integrated Data Processing System (DPS) Principles of Operation (POO) Document Updates</u> - Documents the design, interfaces, and POO of the Shuttle integrated DPS, including multi-functional electronic display subsystem, for knowledge capture, analysis, and training purposes.
1.2.1.7-c	3	<u>Integrated DPS Flight Support Manual</u> - Provides a reference handbook for use by DPS engineering on-station during launch countdown, which will provide clarification of error codes, fault annunciation, and other data useful in formulating a GO/NO GO decision for the DPS.

<b>NAS9-20000 DRD No.</b>	<b>Type</b>	<b>Product</b>
1.2.2.1-a	3	<u>Shuttle Weight, Performance, and Integrated Mass Properties Database and Status Reports</u> - Provides integrated mass properties database and reports necessary to support mission-specific vehicle weight statements and provide management insight for each mission in process, selected reference missions, and special requests.
1.2.2.2-a, 1.2.2.2-b	3	<u>Trajectory Design Data Package and Change Notices</u> - Documents selected mission configuration, groundrules, vehicle performance characteristics, and data for various flight design organizations.
1.2.2.3-a	3	<u>Adjusted Reusable Solid Rocket Motor (RSRM) Preflight Computer Files</u> - Generates adjusted RSRM block motor characteristics for trajectory simulations.
1.2.2.3-b	1	<u>Main Propulsion System (MPS) Inventory/Budget Update and Documentation</u> - Documents the loading and consumption of MPS propellants in the external tank.
1.2.2.4-a	3	<u>Annex 1 - Payload Data Package</u> - To be used by contractor and payload customer as an agreed-to source for the payloads configuration, weight and mass properties, avionics, and physical function data for installation, deployment, and/or retrieval of the payload as related to the Orbiter. Annex substantiates the agreed-to design interfaces as described in the payload-unique Interface Control Document (ICD).
1.2.2.5	3	<u>Interface Revision Notice to Element ICDs</u> - Defines changes to ICDs.
1.2.2.6	3	<u>Payload ICDs and Information Requirements Documents (IRDs)</u> - ICDs - To define the technical interfaces agreed to between the Space Shuttle Vehicle (SSV) and the unique payload or on-orbit assembly. ICDs provide necessary requirements for interface definition to support integration hardware design, payload design and flight product development and include development of a payload avionics control schematic. IRDs - To define the installation assembly requirements for the installation of payload-to-payload elements within the Orbiter by SSP. (An IRD is not required for payloads that are fully assembled prior to installation into the Orbiter.)

<b>NAS9-20000 DRD No.</b>	<b>Type</b>	<b>Product</b>
1.2.2.7	3	<u>Payload Operations and Maintenance Requirements and Specification (OMRS)</u> - To provide the OMRS Board pre- and post-mate test requirements for verification of SSP hardware interfaces with the payload to satisfy NSTS 14046, Section 5.3.
1.2.2.10-a	1	<u>Technical Revision to SL-E-0001 and SL-E-0002</u> - Management and maintenance of SL-E-0001 and SL-E-0002 will be conducted by the Technical Area Manager with approval from the Integration Control Board (ICB) and/or Shuttle Avionics Systems Review.
1.2.2.10-b	3	<u>Element Avionics Interface Databook Updates</u> - Updates information in the Element Avionics Interfaces Databook, Day-of-Launch Support Databook, and Post-Flight Data Processing Procedures.
1.2.2.10-c	3	<u>Element Avionics Interface Design Review Assessment Report</u> - Documents avionics technical hardware and software assessments of proposed element interface avionics design changes.
1.5.5.2 Part 1	2	<u>Facility and Equipment Maintenance Plan and Supporting Data</u> - Provides monthly, quarterly, and annual maintenance metrics providing measures of efficiency and effectiveness. Data is provided and trended by SFOC operating site, as well integrated contract totals.

## 2.0 DOCUMENTATION

### 2.1 APPLICABLE DOCUMENTS

Program documentation defining the procedures, methodologies, and processes to be used in the development of the products covered by this PDP are shown below. The current versions of the following documents are applicable to this PDP and shall be used as described in the specific process descriptions.

<b>Document Number</b>	<b>Document Title</b>
NSTS 07700	Program Definition and Requirements
NSTS 07700, Volume IV	Configuration Management Requirements
NSTS 08117	Requirements and Procedures for Certification of Flight Readiness (CoFR)
NSTS 08126	Problem Reporting and Corrective Action (PRACA) System Requirements
NSTS 08151	Intermediate and Depot Maintenance Requirements Document
NSTS 08171	Operations and Maintenance Requirements and Specifications Document
SFOC-PG9600	Program Management Plan
SFOC-PG9604	Risk Management Plan
SFOC-PM0006	Product Development Plan for Payload Data Package - Annex 1 PDP MS3-008
SFOC-PM0007	Product Development Plan for Payload Engineering Products - OMRSD PDP MS3-009
SFOC-PM0013	Product Development Plan for Cargo Safety PDP MS3-003
SFOC-PM0014	Product Development Plan for Cargo Hardware Design and Development PDP MS3-004
SFOC-PM0015	Product Development Plan for Payload Hardware Logistics Support PDP MS3-005
SFOC-PM0025	Product Development Plan for Customer and Flight Integration Support PDP MT-001
SFOC-PM0026	Product Development Plan for Shuttle Integrated Schedules PDP MT3-002
SFOC-PM0027	Product Development Plan for Shuttle Manifest Support PDP MT3-001
SFOC-PM0047	Product Development Plan for Facility Management Plan, Volume 1 PDP MS8-006

Document Number	Document Title
SFOC-PM0053	Product Development Plan for Combined Element Integration PDP MS4-001
SFOC-PM0056	Product Development Plan for Element Avionics Systems Integration PDP MS-002
SFOC-PM0057	Product Development Plan for Payload/Cargo Structural Analysis PDP MS2-001
SFOC-PM0060	Product Development Plan for Active and Passive Thermal/ECLSS Verification Analysis PDP MS2-002
SFOC-PM0061	Product Development Plan for Payload/Cargo Engineering Products EME PDP MS2-003
SFOC-PM0062	Product Development Plan for Payload Engineering Products Shuttle-to-Payload Interface Requirements PDP MS3-001
SFOC-PM0063	Product Development Plan for Reconfiguration Engineering PDP MS3-002
SFOC-PM0065	Product Development Plan for Payload Engineering Products Payload Unique Interface Requirements PDP M3-007
SFOC-PM0066	Product Development Plan for Program Level and Payload Unique Interface Control Documents PDP MS3-010
SFOC-PM0067	Product Development Plan for Security Management PDP MS3-011
SFOC-PM0068	Product Development Plan for System Safety PDP MS3-006
SFOC-PM0069	Product Development Plan for Flight Systems Analysis PDP MS4-002
SFOC-PM0070	Product Development Plan for KSC Program Boards PDP MS8-002
SFOC-PM0071	Product Development Plan for KSC Requirements Maintenance PDP MS8-003
SFOC-PM0072	Product Development Plan for United Space Alliance Program Integration Certification of Flight Readiness Process PDP MS8-005
SFOC-PM0075	Product Development Plan for Ice Debris and Photographic Evaluation/Support PDP MS8-008

<b>Document Number</b>	<b>Document Title</b>
SFOC-PM0084	Product Development Plan for SSV Engineering Requirements PDP MS8-001
SFOC-PM0085	Product Development Plan for Engineering Information Management Maintenance PDP MS8-004
SFOC-PM0092	Product Development Plan for Space Shuttle Program Systems ICDs PDP MS3-013
SFOC-PM0096	Product Development Plan for Systems Integration Electromagnetic Compatibility PDP MS2-004
SFOC-PM0102	Product Development Plan for Time-Critical Ground Handling Requirements Table PDP MS3-012
SFOC-PM0270	Product Development Plan for Launch Site Requirements Review (LSRR)/Launch Site Flow Review (LSFR) PDP MS8-009
USA003371	Product Development Plan for Flight Integration PDP MT-002
USA004579	Problem Identification and Resolution Process and Procedure

## 2.2 REFERENCE DOCUMENTS

Reference documents used in the development of the products described in this PDP are shown below, along with a listing of additional JSC/MS PDPs which define the next tier of Systems, Cargo, Customer and Flight Integration technical management processes for SFOC. These reference documents are identified as additional sources of related material for informational purposes only.

<b>Document Number</b>	<b>Document Title</b>
JSC 25187, Appendix A	Flight Production Generic Templates
JSC 25187, Appendix B	Flight Production Schedules
NSTS 08349	Space Shuttle Systems Integration Plan for Integrated Mission Support Plan
NSTS 21311	Space Shuttle Program/International Space Station Program Joint Integration Schedule
SFOC-PG9600	Space Flight Operations Contract (SFOC) Program Management Plan
SSD95D0205	Program Integration Flight Preparation Process Definition Document

<b>Document Number</b>	<b>Document Title</b>
Issued under MS letter	Surveillance Plan for the Space Flight Operations Contract (current issue)

### **3.0 MANAGEMENT OPERATIONS TASKS**

This section contains a description of the following:

- a. Management organizations
- b. Management operations processes
- c. Resultant products
- d. Product acceptance criteria
- e. Roles and responsibilities for management oversight and insight
- f. Approach to identifying in-family and out-of-family conditions

### **3.1 MANAGEMENT ORGANIZATIONAL STRUCTURE**

The Program Integration Management Operations Team is comprised of managers representing NASA offices at JSC, Kennedy Space Center (KSC), and Marshall Space Flight Center (MSFC), USA SFOC prime contractor, and Boeing subcontractor, as described in the following sections.

#### **3.1.1 NASA JSC/MS/Space Shuttle Systems Integration Office**

The manager of the NASA JSC/MS/Space Shuttle Systems Integration Office serves as TMR for the Systems, Cargo, Customer and Flight Integration portion of the SFOC contract. In this capacity, the manager provides technical insight on behalf of the NASA SSP Manager and SFOC Contracting Officer's Technical Representative (COTR). This includes the planning and implementation of required surveillance activities; coordination and approval of the disposition of out-of-family occurrences; control authority for changes to requirements, groundrules, or processes; approval of changes to the Systems, Cargo, Customer and Flight Integration PDPs; review of operational budget requirements, and technical and budget management oversight responsibility for the program provisioning portion of the contract.

As depicted with a representative organizational structure in Appendix B, Figure 3-1, assistance is provided by a deputy manager, and the office managers responsible for the Engineering Integration and Project Integration Office. A technical assistant provides a focus on programmatic review, analysis, and performance assessment for contracted activities. A multi-site NASA, USA, and Boeing Program Integration Performance Analysis Team, assists the TMR and Associate Program Manager (APM) with the coordination, integration, and recommendations relative to performance analysis, specific management initiatives, and other activities, as identified.

#### **3.1.2 NASA JSC/MT/Space Shuttle Customer and Flight Integration Office**

The manager of the NASA JSC/MS/Space Shuttle Customer and Flight Integration Office serves as the focal point for NASA management responsibility for JSC/MT/Customer and Flight Integration Office tasks. The manager provides technical

insight on behalf of the Systems Integration TMR. This includes the planning and implementation of required surveillance activities; coordination and approval of the disposition of out-of-family occurrences; control authority for changes to requirements, groundrules or processes; and approval of changes to the Customer and Flight Integration PDPs. (Reference Appendix B, Figure 3-2.)

### **3.1.3 NASA KSC/MK-SIO/Space Shuttle KSC Integration Office**

The manager of the NASA KSC/MK-SIO/Space Shuttle KSC Integration Office serves as a focal point for NASA management responsibility for the KSC Shuttle integration tasks involving mission configuration requirements, Space Shuttle Systems requirements maintenance, and certain technical information systems. The manager provides technical insight on behalf of the Systems Integration TMR including planning and implementation of required surveillance activities; control authority for changes to requirements, groundrules, or processes; and managing the transition of associated tasks, products, and processes to SFOC oversight management responsibility while retaining technical management oversight responsibility for the KSC portion of Program Integration program provisioning.

### **3.1.4 NASA MSFC/MP/Space Shuttle Projects Office**

The manager of the NASA MSFC/MP Space Shuttle Projects Office serves as a focal point for NASA management responsibility for MSFC Shuttle propulsion projects integration tasks involving MSFC Space Shuttle element systems requirements maintenance. The manager provides technical insight on behalf of the Systems Integration TMR including planning and implementation of required surveillance activities, and oversight for program provisioning tasks involving MSFC Space Shuttle element project support.

### **3.1.5 NASA JSC/LM/Resources Management Office**

The NASA JSC/LM/Resources Management Office, within the Space Shuttle Business Management Office, provides the principal NASA business management interface for the Program Integration portion of the SFOC contract. The Resources Management Office is the primary focal point for compiling, analyzing, establishing, and documenting resource requirements and assessing contractor performance or issues.

### **3.1.6 USA Systems, Cargo, Customer and Flight Integration Office**

The USA Systems, Cargo, Customer and Flight Integration Office is headed by a Vice President/APM with overall management responsibility for the Systems, Cargo, Customer and Flight Integration portion of the SFOC prime contract and associated Boeing subcontract. As depicted with a representative organizational structure in Appendix B, Figure 3-3, assistance is provided by a Deputy APM, Program Integration staff, and the department directors who are responsible for the System and Flight Integration, Payload/Cargo Engineering and Customer Integration, Technical Information Systems, Management Integration, and SSP/ISS Program Integration portions of the contract. A KSC Program Integration Director provides a focal point for

KSC Program Integration activities, while the MSFC Project Office Director provides a similar focal point for MSFC Program Integration activities. Since operational tasks, products, and processes have been transitioned from NASA oversight management role to one of NASA insight and USA management oversight, these senior managers ensure that the overall quality and timeliness of the contract performance is maintained. A more detailed discussion of oversight and insight responsibilities is provided in Paragraph 3.6. A business manager provides overall accountability for resource management and reporting for all Program Integration activities.

### **3.1.7 Boeing**

The Shuttle and Space Station Integration Program Office at Boeing has the management responsibility for the Systems and Cargo Integration portion of the USA subcontract with Boeing. The Program Director has the overall decision authority for technical, schedule, and business matters. As depicted with a representative organizational structure in Appendix B, Figure 3-4, assistance is provided by an Associate Program Director (APD) for Payload/Cargo Integration and APD for System Integration who serve as leaders of their respective teams and are responsible for the day-to-day management of contract tasks within their assigned WBS elements. Together, they ensure that the contract tasks for their respective teams are planned and organized in accordance with the Statement of Work (SOW). They direct and control task performance to ensure timely and efficient completion of the products and services in response to established schedules and milestones within the allocated budgets. They provide a customer interface, with respective counterparts, at both USA and NASA, regarding technical and program policy decisions and manage overall compliance with SSP and task requirements.

The Integration Project Managers provide project management leadership for technical direction, resolution of key issues, system compatibilities, work planning, scheduling, program reviews, and product quality. The Chief Engineer (CE) serves as the senior technical management focal point to establish the overall engineering position on CoFR and to integrate problem resolution and Program Director/customer actions across the Payload/Cargo Integration and System Integration teams. Chief Team Engineers (CTEs) from this organization serve as the technical management leadership, on the respective Payload/Cargo Integration and System Integration teams, providing direction for the Project Managers and team members responsible for executing the required tasks. The CEs provide the necessary technical direction, establish the relative task priorities when conflict arises, conduct technical review of output products for quality and content, and evaluate overall task performance.

The Program Business Management Office provides management direction and decisions on matters relating to cost and subcontract performance in the attainment of program objectives. The Assistant Program Business Director assigned for Systems and Cargo Integration is the USA Business Manager's primary interface for support regarding finance performance management and subcontract management issues.

Offices at Houston and Florida operations provide management and technical support for site-unique subcontract tasks performed at their respective locations. The series of

internal and customer reviews described in Section 3.2 helps ensure that all activities are properly coordinated, integrated, and synchronized.

### **3.1.8 Interfaces**

Primary management interfaces between the organizations discussed above are identified in Appendix B, Table 3.1.

## **3.2 TECHNICAL MANAGEMENT**

Technical management focuses on maintaining proper content and quality of required products and services. Effective technical management begins with a clearly defined set of roles and responsibilities from NASA to USA to Boeing. A WBS and associated responsibility assignment matrix (SFOC-PG9600, Program Management Plan) identify a specific focal point for technical management of each process. This focal point is the day-to-day manager who provides the necessary technical direction and control, performance evaluation, identification and resolution of problems and issues, and ensures the overall quality and timeliness of the required products and services. As new work or changes to the baseline requirements are defined, integrated plans of action are prepared and changes documented for management review and concurrence, as required. Status of ongoing work, significant problems/issues, and proposed changes are presented through a variety of internal and customer management review forums, as described in Appendix B, Table 3.2.

### **3.2.1 SSP Requirements**

NSTS 07700, Space Shuttle Program Definition and Requirements, provides the baseline definition of the SSP management and technical requirements. The weekly NASA PRCB is the controlling authority for approval of all changes to these program-level requirements. Chaired by the SSP Manager, the PRCB includes voting membership of USA and the JSC/MS/Space Shuttle Systems Integration Office. This requires a close coordination of the parallel NASA, USA, and Boeing processes for impact evaluation and risk assessment of proposed changes to ensure a complete, integrated, and correct assessment by all parties. Approval authority for certain program-level changes have been delegated per NSTS 07700, Volume IV, Configuration Management Requirements, to lower tier control boards as shown in Appendix B, Figure 3-5. The JSC/MS/Space Shuttle Systems Integration Office provides chairmanship for the ICB and USA Payload/Cargo Engineering Department for the Daily Mission Integration Control Board (DMICB). The USA Systems Integration Review Board (SIRB) is used as the review and approval board for Systems Integration products that have been transitioned from the NASA MS/Space Shuttle Systems Integration Office.

Pre-coordination of Special Daily PRCB agenda items ensures proper impact assessment and adherence to program-level requirements. Weekly status reports are issued highlighting the most significant issues, accomplishments, schedule activities, or open actions to keep management apprised of potential programmatic problems and constraints. Flash reports are generated on an as-needed basis to quickly

communicate the facts of an incident occurrence or issue and the associated plan of action.

System Integration Plans (SIPs) are identified, developed, and maintained to provide the program management planning required to integrate major changes into the SSP. An SIP provides the basis for identification and resolution of potential Shuttle element project issues and secures their commitments on respective responsibilities, activities, products, and resource requirements. The Space Shuttle PRCB approves these plans.

Risk management is a key aspect of the management process within Program Integration. Program Integration identifies and manages risk through the on-going activities of existing risk management mechanisms instituted throughout its operations. These mechanisms include such items as technical reviews, verification activities, assessments, working groups, trend analyses, requirements development, and integration activities, among others. Risks are identified, analyzed and dispositioned as an integrated process. When appropriate, risks are elevated to the appropriate management level for disposition.

Additionally, documented risk assessments are provided for changes proposed at program-level boards and panels in accordance with DRD 1.1.1.4-b. These change evaluation risk assessments identify the risk to safety, supportability, mission success, cost and/or schedule associated with changes initiated or evaluated by USA. A risk is evaluated in terms of its potential consequences and their likelihood of occurrence by utilizing the SFOC risk assessment scorecard. When a significant increase in risk is identified for a change item, options for mitigating risk are provided, along with a recommendation. Program Integration assists in the collection and analysis of metrics gathered to demonstrate USA's compliance with contractual risk assessment requirements.

### **3.2.2 Critical Math Models, Tools, and Databases**

One of the key technical management challenges, as the SSP requirements continue to evolve, is the definition of the integrated vehicle and induced design environments and integrated system certification analyses that verify the acceptability of the proposed changes. The critical math models, analytical tools, and databases are maintained under engineering analysis CM procedures. Proposed System Integration changes are internally documented on an Engineering Analysis Process Request (EAPR) to ensure proper documentation, coordination, testing, and approval. As described in SFOC-PM0069, Product Development Plan for Flight Systems Analysis PDP MS4-002, these System Integration EAPRs are coordinated with the appropriate technical management counterparts prior to implementation through the formal PRCB change process. The process for maintaining configuration control of Cargo Integration structural models and loads analysis tools is described in SFOC-PM0057, Product Development Plan for Payload/Cargo Structural Analysis PDP MS2-001. A parallel process for control of Cargo Integration thermal math models and tools is described in SFOC-PM0060, Product Development Plan for Active and Passive Thermal/ECLSS Verification Analysis PDP MS2-002.

### 3.2.3 Configuration Management of PDPs

As listed in Paragraph 2.1, the Systems, Cargo, Customer and Flight Integration PDPs document and baseline the key technical processes that provide the associated products and services required under the contract. Systems and cargo integration process hierarchy is shown in Appendix B, Figure 3-6. As these processes are identified or changed, such as with transition of technical management responsibility or incorporation of CI efficiencies, a PDP baseline or revision is required.

The DRD 1.1.1.1-f requirement is to update PDPs annually. Changes shall be incorporated by change page or complete reissue. To ensure PDPs are kept current, the following processes are followed:

- a. PDP book managers will perform mandatory annual review for adequacy and obvious corrections and update, as required.
- b. Any changes that affect key process characteristics are to be approved/ incorporated prior to process revision/implementation. Key process characteristics are those aspects of the process that have a direct influence on the process output or that affect end item/product quality or timelines.

Per the SFOC Contract Preamble, Item (f), audit means the implementation of procedures and requirements of the NASA engineering quality audit or other equivalent audit techniques. This is a periodic audit of all aspects of processes and procedures required to manufacture, assemble, test, and process hardware for flight. In the case of the SFOC, the typical definition of audit is expanded to include periodic validation that integration, engineering and flight operations functions continue to be controlled and appropriately implemented. Additionally, these audits are performed on a semiannual basis (frequency may be reduced with time depending on quality of results) and would be performed by the appropriate engineering, operations, and quality organizations under the leadership of the responsible NASA Technical Management Representative (TMR). To ensure this requirements is met, the following processes are followed:

- c. Existing PDPs will be audited on an “as required” basis only when:
  1. No major findings from last audit or other surveillance tools.
  2. Performance metrics have shown no adverse trends.
  3. No changes identified to the key process characteristics.
- d. PDP audits six months after (utilizes current audit process, NASA letter announces the audit with checklist):
  1. All changes to key process characteristics have been implemented.  
(Note: Audit may be on the total PDP or the process change(s) only.)
  2. New baselined PDPs.

All PDP baselines and revisions will be processed by the USA Program Integration Management Integration Office. CM of each PDP will be in accordance with the CM process for PDPs shown in Appendix B, Figure 3-7. The PDP coordinator will obtain a tracking number for each PDP baseline or revision from the USA Baseline Documentation organization. The tracking number is assigned to a review disposition sheet, which accompanies the baseline/revision through the review process. This number will track the flow of the PDP change throughout the Management Integration CM process. The signed hardcopy of the updated PDP will be verified against the updated electronic copy prior to posting to the World Wide Web (WWW) and retained for reference.

### **3.3 BUSINESS MANAGEMENT**

Business Management focuses on ensuring that the contracted efforts are accomplished within established resource and contractual requirements. This involves a rigorous process of establishing funding requirements; documenting a baseline operating plan; exercising the appropriate internal resource management status, analysis, and control; preparing and processing of appropriate change paper; and formal resource management status reporting and reviews, as described in this section.

#### **3.3.1 Establishing a Baseline Plan**

A baseline plan for the Systems, Cargo, Customer and Flight Integration portion of the NAS9-20000 SFOC was originally initialized through a series of joint Work Content Reviews conducted over several months to align work content to the corresponding funding availability. The recommended work content and associated resource requirements were documented in task-level, multi-year decision packages jointly signed by the NASA JSC/MS/Space Shuttle Systems Integration Office and USA Systems, Cargo, Customer and Flight Integration Office and accepted by the SFOC COTR and USA Program Manager. This structured activity based costing process was utilized to negotiate the SFOC. Fiscal year requirements for the prime contractor-managed operations tasks were subsequently summarized and baselined in a Systems, Cargo, Customer and Flight Integration Work Content Plan (WCP), negotiated proposal, and definitized contract and subcontract. If required by program funding constraints, an annual review of any proposed changes to the WBS 1.2 WCP will be conducted, usually during the Program Operating Plan (POP) review process.

For the program provisioning activities, the same process was originally used to provide a baselined WCP providing the basis for documentation and prioritization of the initial fiscal year Program Provisioning Task List (PPTL). The WBS 1.7 WCP documents the detailed work requirements that are utilized to perform to the PPTL annual baseline. The PPTL is the jointly partnered program provisioning work requirements contractual baseline for which a provisioning proposal is submitted, negotiated, and definitized each fiscal year.

The current fiscal year baseline operating plan for incentive and provisioning is reviewed annually to substantiate budget requirements. The baseline operating plan

consists of all authorized work requirements. The PPTL is proposed and definitized on an annual basis. The work content approved from the PPTL proposal becomes the prime contractor's managed operations, as represented in the baseline operating plan. Paragraph 3.3.3 explains how changes to both the incentive and provisioning work requirements are submitted/approved and incorporated into the baseline operating plan. The NASA POP process provides a longer-range projection (usually five years) of the SFOC multi-year funding requirements.

### **3.3.2 Financial and Resource Management**

Financial and resource management ensure that products and services required per the contract are provided within budget availability. The primary sources of all USA and Boeing cost performance by contract, function, WBS, Project ID and department are the SFOC Financial Management System (FMS) and Subcontractor Financial Database (SFD). The FMS is available online to both USA and NASA. The SFD is available to NASA, USA, and Boeing. These systems provide USA and NASA managers with the necessary financial and resource planning and performance data to manage Program Integration financial performance. Monthly Subcontract Performance Reviews between USA and Boeing and Business Management Reviews between NASA and USA are the primary means of communication for the financial performance.

### **3.3.3 Changing the Baseline**

Proposed changes to the contract baseline require different forms of contractual direction depending on the extent and type of change. Generally, changes within the definitions and requirements of the SOW which refine, clarify, reprioritize, or otherwise furnish guidance require written technical direction from NASA to USA. Implementation impacts with the technical direction, if any, are reported back through the contract administrator. If a more extensive change to the baseline is necessary, a Change Order (CO) is issued to modify the SOW or other prime contract requirements. USA documents cost, schedule, and other impacts associated with the CO in a formal proposal or Change Package Agreement (CPA). On Provisioning, if below threshold effort is approved, a Program Provisioning Technical Direction (PPTD) is used to authorize the task. If the provisioning task is above the threshold, a formal proposal or CPA is submitted. If a change is required to the NASA-managed activities baselined in the fiscal year PPTL, a PPTD request is partnered and processed to document the work content, budget, schedule, or other impacts associated with the change as a precursor to the formal proposal or CPA.

## **3.4 PRODUCTS**

The major products of management operations processes are the management decisions, assessments, and recommendations that determine the technical, schedule, and cost performance of the Systems, Cargo, Customer and Flight Integration portion of the SFOC and associated Boeing subcontract. The SFOC DRDs explicitly or implicitly reflect these requirements. Reference Section 1.0 for a complete products listing.

### **3.5 PRODUCT ACCEPTANCE CRITERIA**

The primary products of management operations processes are the management decisions, assessments, and recommendations which determine the technical, schedule, and cost performance of the Systems, Cargo, Customer and Flight Integration portion of the SFOC. There are objective performance evaluation methods utilized:

- a. Award fee criteria and evaluation
- b. Cost incentive criteria and performance
- c. Flight performance incentive criteria and evaluation
- d. Monthly advisory report memorandum (PIRP/Preventative Corrective Action Review [PCAR])
- e. Performance management system metrics

### **3.6 ROLES AND RESPONSIBILITIES**

USA has oversight responsibility for all the tasks, activities, and contractual requirements identified in the SFOC. This accountability includes the oversight and management of all aspects of the Boeing subcontract. NASA retains process control of the incentive portion of the SFOC through the baseline PDPs, surveillance capability as described in Section 6.0, and responsibility for out-of-family problem resolution as described in Section 3.8.

For the provisioning activities and tasks identified in the annual PPTL, USA is responsible for managing the task performance by its subcontractor, Boeing, as a completion form effort by ensuring technical quality, schedule adherence, and resource performance. Close coordination is required with NASA to ensure that the PPTL tasks which develop SSP requirements, products, or integration hardware do not have unforeseen impacts to the implementation of operational tasks, products, and schedules associated with the incentive portion of the SFOC. NASA retains a requirements definition, content approval, and budget authorization role for all provisioning tasks, while USA is accountable for the subsequent implementation, product delivery, and day-to-day issues relative to the tasks defined and authorized by NASA.

### **3.7 IN-FAMILY/OUT-OF-FAMILY CONDITIONS**

The SSP approved definition for determining in-family and out-of-family conditions is contained in NSTS 08126, Shuttle Problem Reporting and Corrective Action (PRACA) System Requirements, which states:

- a. In-Family: Manufacturing, processing, and operations within the experience base as program-accepted performance are defined as in-family. This includes performance within the expected performance range and in compliance with established requirements and processes for the end item or system. Established

program requirements include engineering drawings and specifications; engineering requirements; acceptance test requirements; NSTS 08171, Operations and Maintenance Requirements and Specifications Document; Launch Commit Criteria; NSTS 08151, Intermediate and Depot Maintenance Requirements Document; certification basis; and flight constraints and limits, as modified by approved waivers and exceptions. Activities to return to the design requirements or performance specification by removal and replacement or rework using a standard repair or maintenance procedure approved by the design project are in-family. Out-of-limits performance or discrepancies which have been previously experienced may be considered as in-family, when specifically approved by the SSP or design project.

- b. Out-of-Family: Operation or performance outside the expected performance range of parameters or which has not previously been experienced is out-of-family. This disposition of discrepancies or nonconformances which affect the configuration, certification, mission success, safety critical functions, hazards controls, or weight in excess of two pounds (equivalent performance to orbit) is out-of-family. Adverse problem trends are out-of-family. Discrepancies or nonconformances which the operator determines requires design element analysis or assistance for resolution are out-of-family. Unexplained anomalies or events are out-of-family. Any activity or condition not expressly defined as in-family is out-of-family.

Based on the above definitions, specific criteria for in-family and out-of-family conditions that occur within Systems, Cargo, Customer and Flight Integration technical processes are identified and documented in the respective PDPs covering those processes. It is the responsibility of the appropriate project management to identify potential out-of-family conditions based on the criteria to their respective prime contractor counterparts. USA program management has the responsibility to ensure that these out-of-family conditions are brought to the attention of the respective NASA counterparts for assessment, investigation, resolution, or concurrence, as required.

### **3.8 PROBLEM IDENTIFICATION AND RESOLUTION PROCESS**

The PIRP maintain communication and feedback on USA and subcontractor performance related to nonconformance indicators, as depicted in Appendix B, Figure 3-8. Identified problems are reported in monthly advisory letters, midterm and final award fee evaluations, and PDP audits. The program element point of contact coordinates the overall identification, reporting and resolution of the nonconformance through the Program Element Performance Evaluation Reporting (PEPER) database. Resolution information is directly applied to the database by program element department points of contact and is tracked, via report forms and a formal review process, with the NASA customer. The NASA customer reviews applicable nonconformances and metrics on a quarterly basis with the NASA SSP Manager. The approved corrective action plan forms are considered quality records.

The PIRP process is managed by the USA Program Integration APM Office. The nonconformance process is explained in detail in USA004579, Problem Identification and Resolution Process and Procedure. This operating plan is accessible via the SFOC Electronic Library System.

#### **4.0 CoFR ACCOUNTABILITIES**

The CoFR products, processes, and responsibilities for Systems, Cargo, Customer and Flight Integration are defined in NSTS 08117, Requirements and Procedures for Certification of Flight Readiness and SFOC-PM0072, Product Development Plan for United Space Alliance Program Integration Certification of Flight Readiness Process PDP MS8-005. Prior to the SSP Flight Readiness Review (FRR), all products, processes, and responsibilities to assure readiness for flight in compliance with NSTS 08117 are accomplished and reported to the NASA JSC Space Shuttle Program Office at the Program Integration Pre-FRR. This review, by a joint management team of NASA, USA, and Boeing, is conducted approximately Launch - 29 days and is sequentially chaired by the APM, USA Program Integration and the NASA Manager, SSP Integration. The joint management team exercises their respective responsibilities as NASA, USA prime contractor, and Boeing subcontractor to assure compliance with documented flight preparation process requirements and signs the appropriate CoFR endorsement subsequent to the Pre-FRR.

Prior to the scheduled launch date, the SSP Mission Management Team (MMT) is activated to review any actions, issues, concerns, or exceptions to program or mission requirements since the FRR. The Program Integration Management Team, with members from NASA, USA, and Boeing, reviews the status and disposition of their respective items for presentation, as necessary, to the MMT review. On launch day, the Program Integration team members are polled for a final GO/NO GO, to assure final flight readiness.

## 5.0 CONTINUOUS IMPROVEMENT

CI is a key strategy of Program Integration for improving productivity, achieving cost savings, and achieving other economies and efficiencies across all work performed by Program Integration.

A fiscal year CI plan is developed that identifies candidate initiatives and training needs for Program Integration. The CI plan is monitored for compliance to company CI standards and can be found at the Program Integration website:

<http://usa1.unitedspacealliance.com/usahou/orgs/70-01/CI.htm>. Initiative teams are structured to encourage the use of CI tools and techniques, as defined in the NAS9-20000, Attachment J-16, Continuous Improvement Plan for the SFOC.

Program Integration developed a CI initiatives database to track the process improvements the individual initiative teams are assigned to implement. Some of the integral functions of this database are:

- a. Provides a mapping to USA goals for the Vision Support Plan (VSP) reporting.
- b. Maps directly to NASA and USA goals.
- c. Provides milestone schedule monitoring.
- d. Measures safety and risk utilizing the SFOC-PG9604, Risk Management Plan process.
- e. Provides a Quick Look Report at individual project level.

Initiative reporting is provided each month, via the VSP board, and in conjunction with the monthly Joint Integrated PIRP Review.

Program Integration identified CI trainers and facilitators spanning USA Houston, Huntsville, and Florida. The trainers and facilitators are responsible for ensuring the CI process is coordinated and implemented in accordance with company standard. Teams are encouraged to participate in CI training, prior to team kickoff, and facilitators are available to teams for use of defining an approach to focus the initiative in a specific area of process development.

Each fiscal year, the CI plan is reviewed for completion or status of predefined tasks, and is updated to ensure future plans are identified for the PI element. A status summary is prepared for company reporting based on the previous year task schedules and plans. It is the intent to continue reporting CI plans and identifying teams as part of maintaining a high standard of continual process improvement. All management team members are responsible for supporting the CI methodologies throughout each organization of Program Integration.

## **6.0 SURVEILLANCE**

The Systems, Cargo, Customer and Flight Integration Surveillance Plan for SFOC defines how the NASA TMR will monitor performance. The PDPs, documenting the operational processes and products, become an integral part of defining the baseline for surveillance. Contract performance against the SOW performance standards, along with evaluation of effectiveness in meeting the award fee areas of emphasis criteria, and flight performance incentive criteria, are indicators that performance is within expectation. Data available from the USA performance management system, FMS, and other management information systems will also be utilized. Surveillance tools include inspection, observation, audits, management information systems, and customer comments. Assessments will be measured against the standards and Maximum Error Rates (MERs), quality, schedule, cost, product acceptance criteria, CI, and CoFR accountability. Specific tools and assessments for each PDP and the PPTL are identified within the Surveillance Plan. The scope includes JSC, KSC, and MSFC integration contract requirements.

## **7.0 METRICS**

Good management decisions are based on evaluation of task requirements, priorities, and metrics to maintain technical, schedule, and cost performance summary and assessment to successfully accomplish goals and objectives. Incentive metrics for Systems, Cargo, Customer and Flight Integration products are provided, monthly, through the SFOC PMS in order to manage and monitor performance against established standards and MERs. The respective NASA, USA, and Boeing management teams have identified additional metrics to evaluate performance results, to provide management with early problem identification, to establish baseline performance data for processes and products, or to analyze the need for, or results of, CI actions.

Provisioning metrics, known as Nemitz charts, are also provided monthly as a one page status chart which was developed to provide technical, cost, and schedule data of provisioning tasks. This data has been provided for tasks that are greater than \$.250M. In both cases, tasks incurred should be made with performance periods greater than six months.

Both incentive and provisioning metrics described above are delivered to NASA on a monthly cycle as an SFOC product of DRD 1.1.2.2-B.

**APPENDIX A**  
**ACRONYMS AND ABBREVIATIONS**

**APPENDIX A**  
**ACRONYMS AND ABBREVIATIONS**

The following acronyms and abbreviations appear in this PDP.

AF	Award Fee
APD	Associate Program Director
APM	Associate Program Manager
CE	Chief Engineer
CI	Continuous Improvement
CM	Configuration Management
CO	Change Order
CoFR	Certificate of Flight Readiness
COTR	Contracting Officer's Technical Representative
CPA	Change Package Agreement
CR	Change Request
CTE	Chief Team Engineer
DMICB	Daily Mission Integration Control Board
DOSS	Day-of-Launch Support System
DPS	Data Processing System
DRD	Data Requirements Document
EAPR	Engineering Analysis Process Request
ECLSS	Environmental Control and Life Support System
EME	Electromagnetic Compatibility
FMS	Financial Management System
FRR	Flight Readiness Review
ICB	Integration Control Board
ICD	Interface Control Document
IFA	In-Flight Anomaly
IMR	Integration Management Review
IRD	Information Requirements Document
ISS	International Space Station
IT	Information Technology
JSC	Johnson Space Center

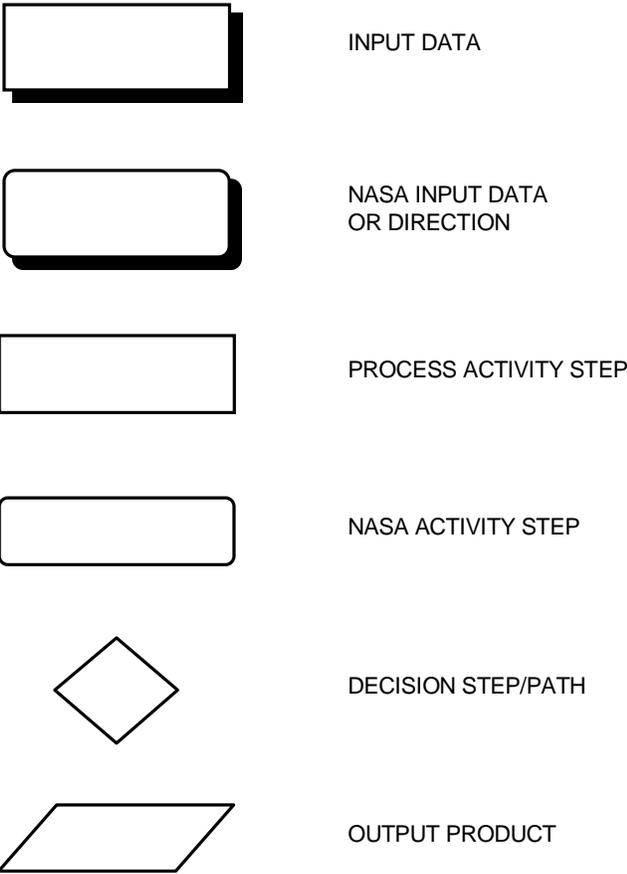
KSC	Kennedy Space Center
MAL	Monthly Advisory Letter
MER	Maximum Error Rate
MMT	Mission Management Team
MPS	Main Propulsion System
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
OMRS	Operations and Maintenance Requirements and Specifications
PDP	Product Development Plan
PEPER	Program Element Performance Evaluation Reporting
PIRP	Problem Identification and Resolution Process
PMS	Performance Measurement System
POO	Principles of Operation
POP	Program Operating Plan
PPTD	Program Provisioning Technical Direction
PPTL	Program Provisioning Task List
PRACA	Problem Reporting and Corrective Action
PRB	Program Review Board
PRCB	Program Requirements Control Board
RSRM	Reusable Solid Rocket Motor
SDPRCB	Special Daily Program Requirements Control Board
SFD	Subcontractor Financial Database
SFOC	Space Flight Operations Contract
SIP	System Integration Plan
SIRB	Systems Integration Review Board
SOW	Statement of Work
SSEIG	Space Shuttle Engineering Integration Group
SSP	Space Shuttle Program
SSUPRCB	Space Shuttle Upgrades Program Requirements Central Board
SSV	Space Shuttle Vehicle
TMR	Technical Management Representative
USA	United Space Alliance
VSP	Vision Support Plan

WBS	Work Breakdown Structure
WCP	Work Content Plan
WWW	World Wide Web

**APPENDIX B**  
**TASK PROCESS**

**APPENDIX B**  
**TASK PROCESS**

This appendix contains the task process diagrams discussed in the PDP document. The following legend can be used to indicate input data, process activity steps, and output products:



**TABLE 3.1  
PROGRAM AND SPACE STATION INTEGRATION MANAGEMENT INTERFACES**

NASA	USA	Boeing
Manager, Deputy Manager, and Technical Assistant, JSC/MS/Space Shuttle Systems Integration Office	APM, Deputy APM, and Staff Program Integration Office	Program Director, Deputy Program Director, CE, Shuttle and Space Station Integration Office
Manager, JSC/MS2/Engineering Integration Office  Manager, JSC/MS3/Project Integration Office	Director, Payload/Cargo Engineering  Director, KSC Program Integration  Director, Management Integration  Director, MSFC Integration	APD and CTE, Payload/Cargo Integration Team
Manager, JSC/MS2/Engineering Integration Office  Manager, JSC/MS3/Project Integration Office  Manager, KSC/MK-SIO/Space Shuttle KSC Integration Office	Director, System Integration  Director, Technical Information Systems  Director, KSC Program Integration  Director, Management Integration  Director, MSFC Integration	APD and CTE, System Integration Team

**TABLE 3.1  
PROGRAM AND SPACE STATION INTEGRATION MANAGEMENT INTERFACES – Concluded**

NASA	USA	Boeing
Manager, MSFC/MP/Space Shuttle Projects Office  Manager, JSC/MS/Space Shuttle Systems Integration Office	Director, Systems Integration  Director, MSFC Program Integration	
Manager, JSC/LM/Resources Management Office	Business Manager, Program Integration Office	Assistant Program Business Director
Manager, JSC/MT/Customer and Flight Integration Office	Director, Systems Integration  Director, Management Integration  Director, Payload/Cargo Engineering	

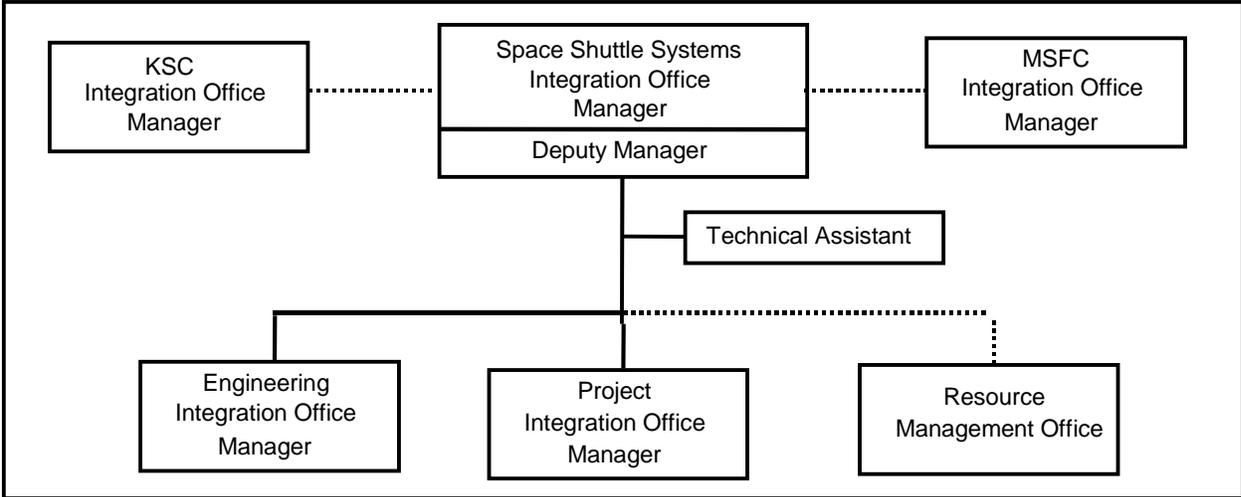
**TABLE 3.2  
MANAGEMENT REVIEW FORUMS**

Name	Key Management	Frequency	Focus
SFOC Program Review Board	<u>USA:</u> APM, Directors <u>Boeing:</u> Program Director, Deputy Program Director	Weekly	USA management approval forum for change evaluations, CRs, and other program-level decisions.
Integration Management Review (IMR)	<u>NASA:</u> JSC/MS Manager, Deputy Manager, Technical Assistant, and Branch Office Managers; KSC/MK-SIO Manager; JSC/BV/MM3 Business Manager Team Lead; MSFC/SA01 Office  <u>USA:</u> APM, Deputy APM, Directors, Business Manager  <u>Boeing:</u> Program Director, Deputy Program Director, APDs, CEs, CTEs, Offsite Management	Quarterly	Joint management review forum for program performance and special topics/issues spanning all sites.
Subcontract Performance Review	<u>USA:</u> APM, Deputy APM, Directors, Business Manager  <u>Boeing:</u> Program Director, Deputy Program Director, APDs, CE, Assistant Program Business Director	Monthly Telecon, Quarterly Face-to-Face	USA and Boeing management review forum for status of subcontract technical performance and special topics/issues.

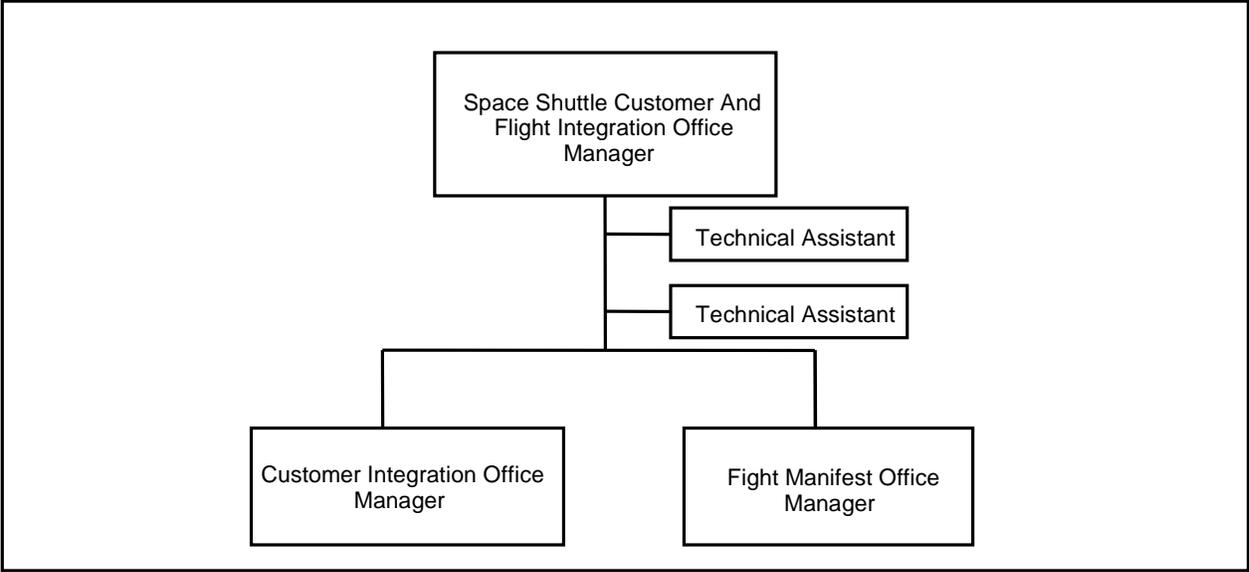
**TABLE 3.2  
MANAGEMENT REVIEW FORUMS - Concluded**

Name	Key Management	Frequency	Focus
Friday Management Teleconference	<p><u>NASA</u>: JSC/MS Manager, Deputy Manager, Assistant Manager, Technical Assistant, and Branch Office Managers; KSC/MK-SIO Manager; JSC/BV/MM3 Business Management Team Lead; MSFC/SA01 Office</p> <p><u>USA</u>: APM, Deputy APM, Directors, Business Manager</p> <p><u>Boeing</u>: Program Director, Deputy Program Director, APDs, CEs CTEs</p>	Bi-Weekly	Joint management review forum for status of program milestone readiness, flight preparation process, development tasks, and problem identification and resolution status and review of major initiatives.
Integration Control Board (ICB)	<p><u>NASA</u>: Systems Integration</p> <p><u>USA</u>: Represented APM, Directors</p> <p><u>Boeing</u>: APDs, CEs, CTEs</p>	Weekly	Joint forum for handling changes to requirements and documentation that have been delegated by the PRCB.

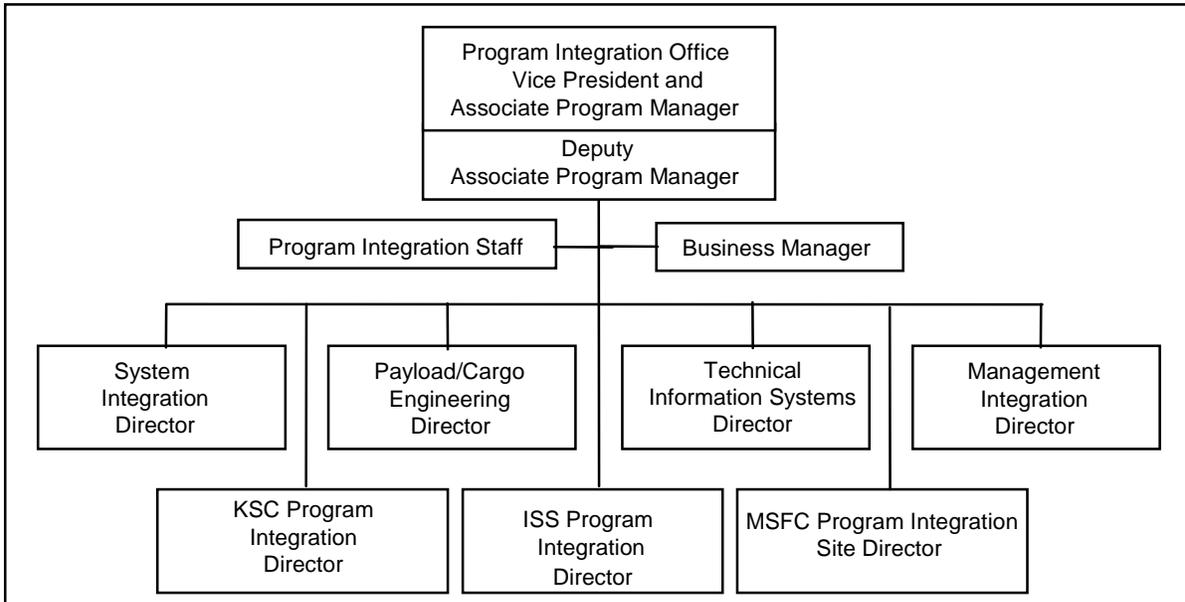
**FIGURE 3-1**  
**NASA JSC/MS/SPACE SHUTTLE SYSTEMS INTEGRATION OFFICE**



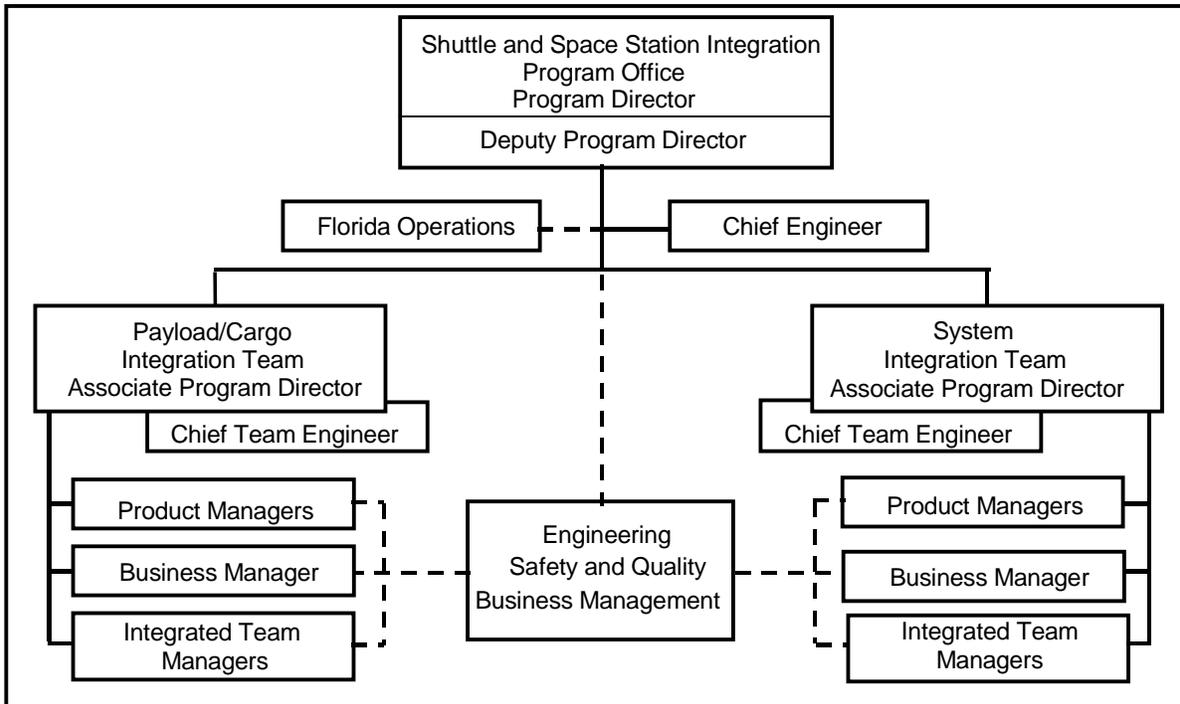
**FIGURE 3-2  
NASA JSC/MT/SPACE SHUTTLE CUSTOMER AND FLIGHT INTEGRATION  
OFFICE**



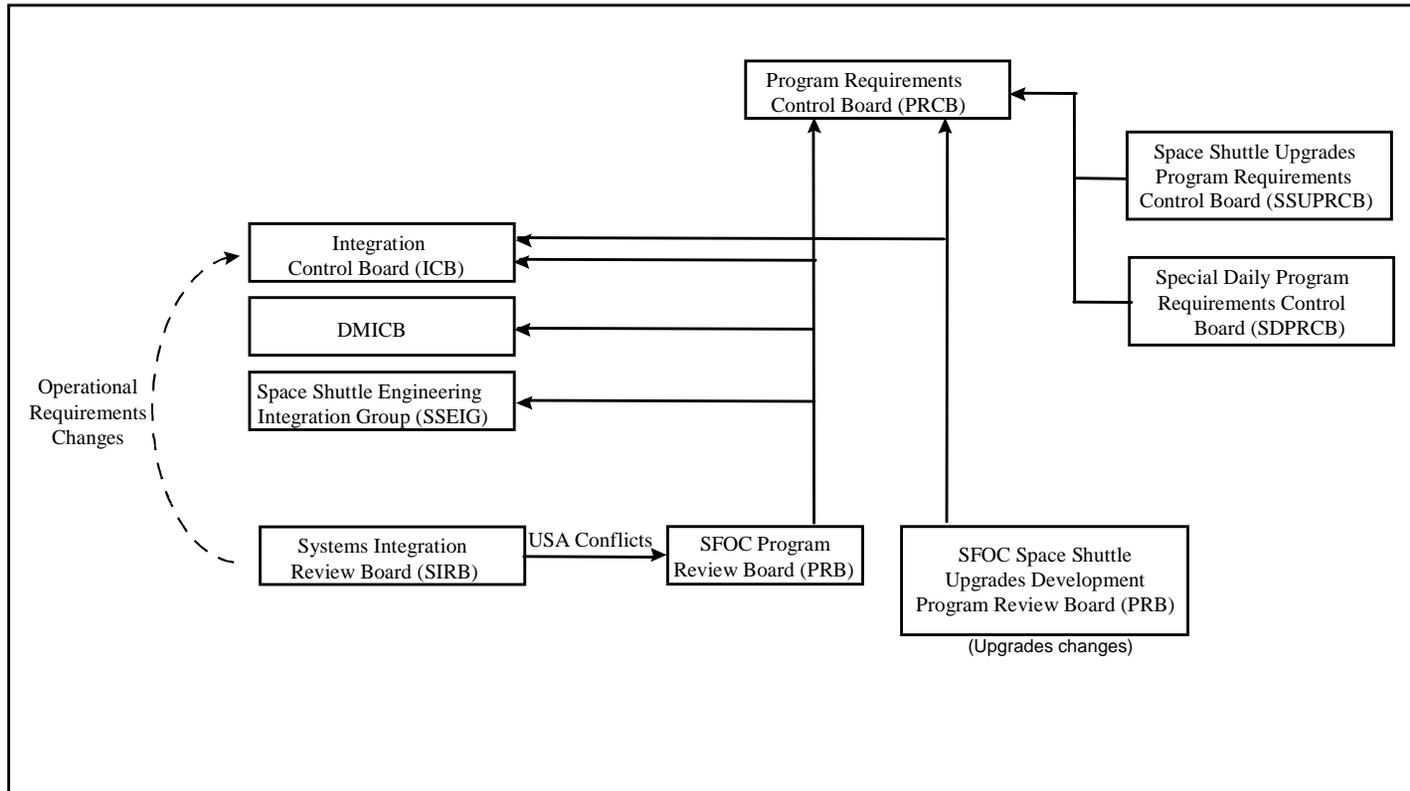
**FIGURE 3-3  
USA SYSTEMS, CARGO, CUSTOMER AND FLIGHT INTEGRATION OFFICE**



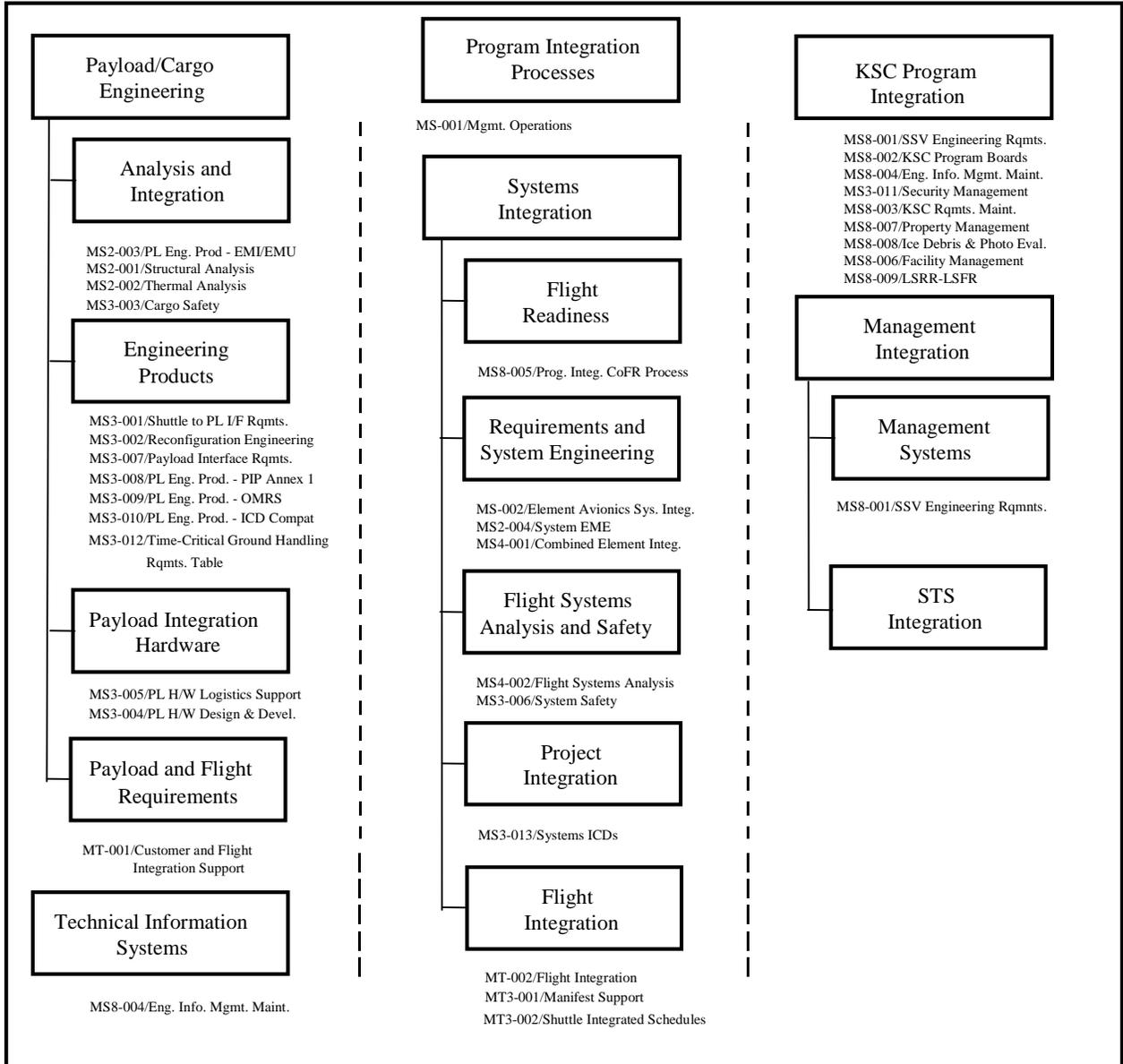
**FIGURE 3-4  
BOEING SHUTTLE AND SPACE STATION INTEGRATION ORGANIZATION**



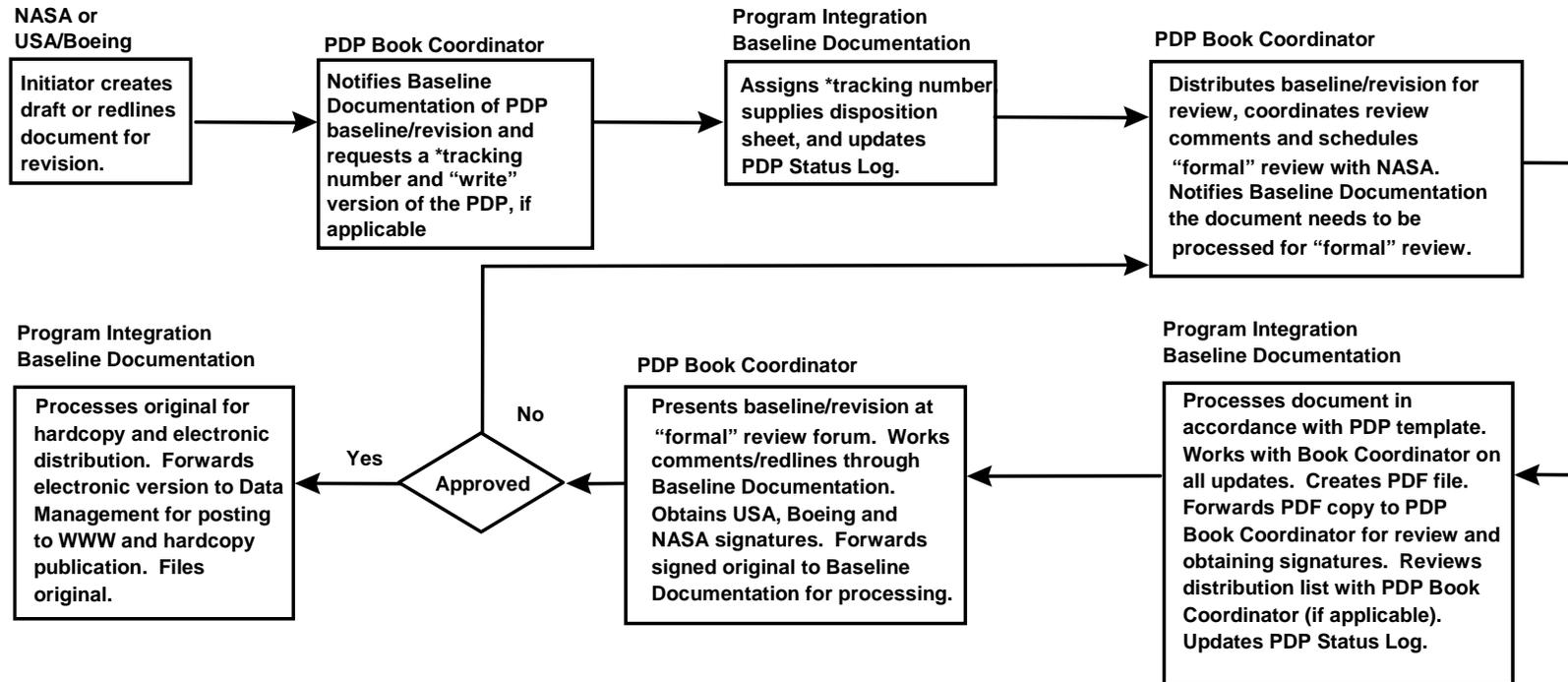
**FIGURE 3-5  
PROGRAM REQUIREMENTS CONTROL HIERARCHY**



**FIGURE 3-6  
SYSTEMS, CARGO, CUSTOMER AND FLIGHT INTEGRATION MACRO/PROCESS HIERARCHY**

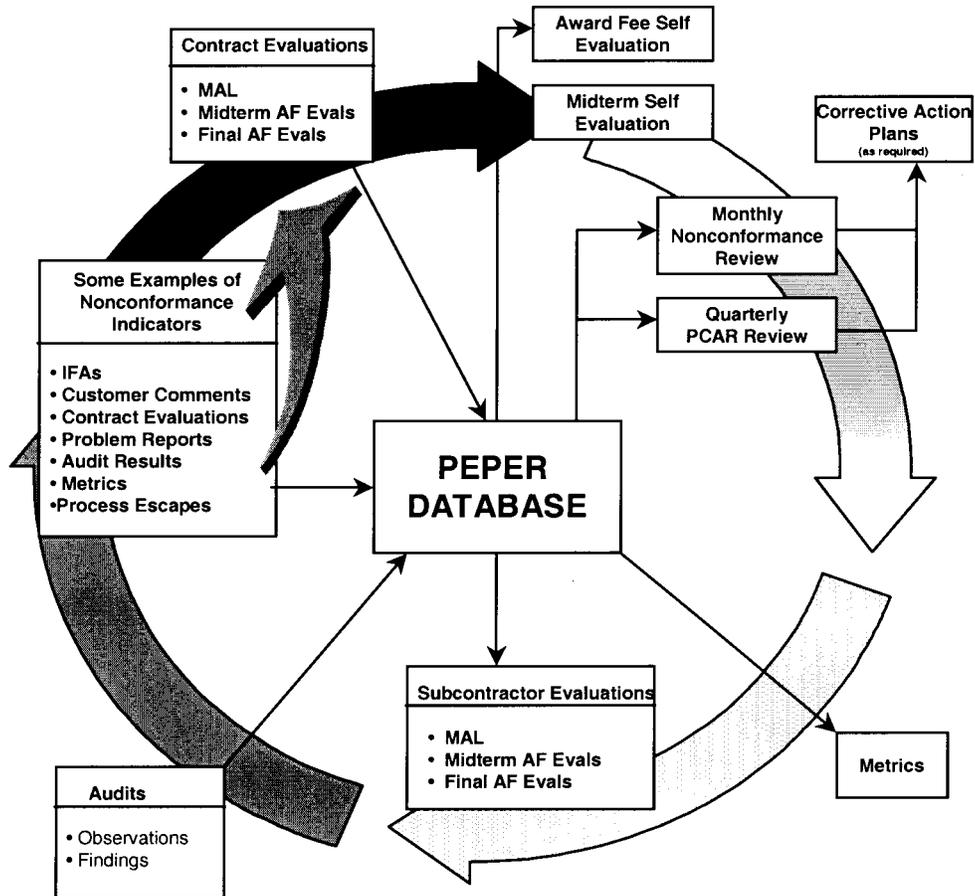


**FIGURE 3-7  
CONFIGURATION MANAGEMENT OF PDPs**



\*Tracking number assigned if required by TMR.

**FIGURE 3-8  
PROBLEM IDENTIFICATION AND RESOLUTION PROCESS AND PROCEDURE  
INTEGRATED PROCESS SUMMARY**



TITLE: PRODUCT DEVELOPMENT PLAN FOR PROGRAM INTEGRATION MANAGEMENT OPERATIONS  
PDP MS-001

---

NASA-JSC

MM	D. Rasco
MM	J. B. Costello
MG	R. H. Heselmeyer
*MS	L. D. Austin
MS2	R. O. Wallace
MV2	D. E. Stamper
MA	W. J. Harris
MV6	P. Petete
CA	S. Hawley
DA	J. C. Harpold
OC	M. G. Kennedy
BV	J. Trahan
*BV	N. Moses
BV22	D. Danks
MS3	D. L. Ladrach
LM	S. C. Horton
MT	M.A. Brekke

USA-HOUSTON

USH-121G	SFOC Technical Library
*	USH-702B Baseline
	Documentation
USH-702B	T. E. Smith
USH-702B	M. S. Bauer
USA-702B	C. N. Vickery

NASA - KSC

MK-SIO-A	A. Swift
MV7	J. Cowart
OP-MS	C. Hurst
MK-SIO	R. Segert

NASA-MSFC

MP71	J. Martin
CR55	C. Chesser

\*Hardcopy Distribution.

Submit NASA distribution changes to JSC Shuttle Acquisition Data Management/BV, including initiator's name and phone number, or e-mail [NATASHA.O.MOSES1@JSC.NASA.GOV](mailto:NATASHA.O.MOSES1@JSC.NASA.GOV) or call 281-244-8506. Submit USA distribution changes to USA Data Management/USH-121E, or e-mail USA DM@USAHQ.UNITEDSPACEALLIANCE.COM. Most documents are available electronically via USA Intranet Web ([usa1.unitedspacealliance.com](http://usa1.unitedspacealliance.com)), Space Flight Operations Contract (SFOC), SFOC Data and Deliverables.