National Aeronautics and Space Administration

NASA Transition Management Plan

For Implementing the U.S. Space Exploration Policy

JICB-001
August 2008

This document is an official release of the Exploration Systems Mission Directorate (ESMD) and Space Operations Mission Directorate (SOMD) and is coordinated with the Mission Support Offices. Its guidance shall be implemented by program elements of the combined directorates.

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1. OVERVIEW

Transition encompasses the careful planning, utilization, and disposition of the Space Shuttle Program (SSP) and the International Space Station Program (ISSP) processes and resources, while leveraging existing assets for the safety and success of future Exploration missions.

1.1. INTRODUCTION

The National Aeronautics and Space Administration (NASA) Transition Management Plan provides the strategic foundation for the management and execution of transition efforts. This plan contains the Agency-level goals, objectives, roles, and responsibilities necessary to execute NASA Transition efforts. Transition activities are conducted consistent with the intent of NASA Policy Directive (NPD) 1000.0, NASA Strategic Management and Governance, and NASA Policy Requirement (NPR) 7120.5D, NASA Space Flight Program and Project Management Requirements, as well as established Agency systems engineering and integration processes, and management best practices.

Appendix A contains a list of acronyms used in this document.

1.2. AUTHORITY

In January 2004, the President of the United States (U.S.) announced a new plan to advance the Nation's scientific, security, and economic interests through a robust space exploration program that integrates human and robotic exploration activities. The U.S. Space Exploration Policy (NP-2004-01-334-HQ, *Vision for Space Exploration*) commits the U.S. to implement a sustainable and affordable human and robotic program to explore the solar system and beyond. This policy commits the Nation to extend human presence across the solar system, starting with a human return to the Moon by the year 2020, in preparation for human exploration of Mars and other destinations.

Congress then enacted the NASA Authorization Act of 2005 (P.L. 109-155), providing that the Agency, *"shall establish a program to develop a sustained human presence on the Moon, including a robust precursor program, to promote exploration, science, commerce, and United States preeminence in space, and as a stepping-stone to future exploration of Mars and other destinations."*

1.3. OVERVIEW

1.3.1. DEFINITION OF NASA TRANSITION

"Transition" is a framework for integration and management of the large-scale changes associated with implementing the U.S. Space Exploration Policy. Transition establishes rigorous, systematic processes for brokering mitigations to cost, schedule and mission success risks induced by the concurrent development of future Exploration capabilities, ongoing execution of spaceflight missions, and retirement of completed spaceflight programs. This encompasses the careful planning, optimized utilization, and responsive disposition of processes, personnel, resources, and real and personal property, focused upon leveraging legacy assets for Exploration programs' safety and mission success.

The development of space systems that will enable human exploration beyond low-Earth orbit (LEO) is the role of the ESMD, with the specific design and development of human spaceflight capabilities charged to the Constellation Program (CxP). The operation of current and future space transportation and habitation capabilities is managed within the SOMD, with the SSP and ISSP being responsible for execution of current human spaceflight missions.

Simultaneous implementation of these large-scale, interrelated spaceflight programs necessitates proactive management of the interfaces and risks shared between the development and operations communities. The Transition strategy requires that these risks, and respective solutions, be identified in a timely fashion, widely communicated, and thoroughly vetted through a series of project, program, directorate, and Agency-level reviews and decision-making bodies.

In this case, Transition comprises three distinct phases along a continuum of ongoing and future activities that impact both the development of Exploration systems and the operation of current and future systems. These phases are driven primarily by major milestones for vehicle retirement and development events and are listed below.

Phase I: Shuttle Transition and Retirement Planning (Through Fiscal Year (FY) 2010)
This phase includes the planning and early execution of SSP Transition & Retirement (T&R) activities (including phaseout activities encompassing closeout and transfer actions); ISSP changes due to Shuttle Transition and Retirement (STaR); and the identification and early utilization of legacy assets by CxP.

Phase II: Shuttle and Constellation Transition Implementation (FY 2011-2015)
This phase includes the retirement of the SSP and execution of SSP T&R plans, including the disposition of all assets; ISSP operation without Shuttle transportation; and the assumption of legacy infrastructure and assets by CxP leading to initial operating capability

Phase III: Future Transition (FY 2016 and beyond)
These activities include the recurrent CxP transitions from development to operations as the Exploration architecture continues to mature with the development of new elements such as a lunar habitat. This phase may also include the decommissioning of the International Space Station (ISS) (pending a future decision).

In the near term, NASA Transition is focused primarily upon the crosscutting activities associated with the completion of SSP and the beginning of Exploration activities. Therefore, this iteration of the NASA Transition Management Plan delineates the overarching strategies for Phase I and establishes a structure for decision making heading into Phase II. This plan will be updated as necessary to ensure efficient and effective execution of Phases I and II.

1.3.2. Scope of Transition Activity

The scope of NASA Transition activities is vast, with the Space Shuttle T&R effort being one of the largest that the Agency has undertaken in its history. The SSP has an extensive array of assets; the program occupies over 654 facilities, uses over 1.2 million line items of hardware and equipment, and employs over 2,000 civil servants, with more than 15,000 work year equivalent personnel employed by the contractors. In addition, the SSP employs over 3,000 additional indirect workers through Center Management and Operations and service accounts. The total equipment acquisition value is over $12 billion, spread across

hundreds of locations. The total facilities replacement cost is approximately $5.7 billion, which accounts for approximately one-fourth of the value of the Agency's total facility inventory. There are over 1,200 active suppliers and 3,000 to 4,000 qualified suppliers geographically located throughout the country.

Because of the size, complexity, and dispersion of the SSP's assets, T&R requires thorough planning. In addition to the sheer size of asset disposition activities, the Agency must also consider carefully maintaining the SSP in order for it to meet its highest priority of safely completing the mission manifest by the end of FY 2010. As ISS assembly is completed and the SSP mission comes to a close, Exploration development activities will continue and increase in scope. Use of certain legacy capabilities can reduce the time and resources necessary to achieve initial operational capability of the new designs. The NASA Transition effort described herein provides the framework for coordinating the smooth transition of SSP and ISS assets and capabilities to the next generation of Exploration systems as the CxP matures, bringing new, U.S. human spaceflight capabilities that extend space exploration beyond LEO to the Moon, Mars, and beyond.

1.3.3. Transition Timeline

Guided by the U.S. Space Exploration Policy as presented to the Nation in the Vision for Space Exploration in January 2004 and the subsequent NASA Authorization Act of 2005, NASA is evolving from current operations of flying the Space Shuttle and assembling the ISS to sustaining the ISS and then developing and flying the CxP's series of vehicles for exploring the Moon, Mars, and beyond. The Exploration Roadmap is shown in Figure 1.

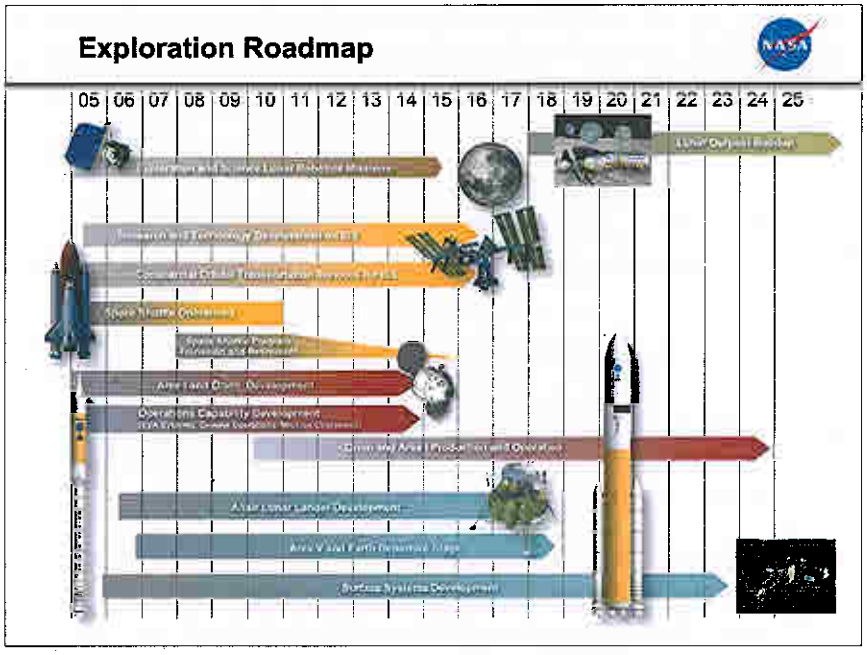


Figure 1. Exploration Roadmap

The Multi-Program Integrated Milestones (MPIM) serves as an Agency-level Exploration roadmap that captures the primary human spaceflight program operations and acquisition milestones, including major infrastructure and industrial base drivers, in a single, Agency-integrated schedule. This schedule is updated and certified quarterly for use both internally

and externally by NASA Headquarters (HQ), the Centers, institutions, programs, Congress, the White House, media, industry, and others for planning of development, testing, operations, budgets, acquisition, production, and execution. An updated and current version is located on the NASA Transition Web site: http://www.nasa.gov/transition.

NASA Transition activities began in January 2004. At that time, the SSP evaluated hardware, infrastructure, and workforce inventories needed to support a flyout through FY 2010 and determined a plan to retire those capabilities that were no longer needed. The ISS Program identified the impact and challenges of Shuttle retirement on Station logistics support and utilization. These content and budgetary changes were documented in NASA's annual performance and budgeting process during 2006 and 2007 and are referred to as STaR requirements. In 2007, content previously defined as STaR was incorporated into the ISSP technical baseline. NASA also conducted a number of benchmarking studies of previous, large-scale, high-technology system transitions, including the Titan IV rocket flyout, the F/A-18 fighter production closeout, and Navy base realignment and closure activities. NASA captured lessons learned that might be applicable to its Transition activities.

2. GOVERNANCE

A successful Transition depends upon a robust framework that leverages Agency capabilities and partnerships.

2.1. APPLICABLE DOCUMENTS

NASA Transition shall use existing guidance, processes, and direction whenever applicable and appropriate. The following table contains a list of primary documents that are either directly applicable or related to NASA Transition.

Table I. Applicable Documents

Document Number or Date	Document Name
8/1/2008	NASA Procurement Tenets
NP-2004-01-334-HQ	U.S. Space Exploration Policy (Vision for Space Exploration)
NPD 1000.0	Strategic Management and Governance Handbook
NPD 1001.0	2006 NASA Strategic Plan
NPD 1440.6G	NASA Records Management
NPD 2110.1E	Foreign Access to NASA Technology Transfer Materials
NPD 2190.1A	NASA Export Control Program
NPD 4300.1B	NASA Personal Property Disposal Policy
NPD 8500.1A	NASA Environmental Management
NPD 8800.14C	Policy for Real Property Management
NPR 1441.1D	NASA Records Retention Schedules
NPR 1600.1	NASA Security Program Procedural Requirements
NPR 2200.2B	Requirements for Documentation, Approval, and Dissemination of NASA Scientific and Technical Information
NPR 2210.1A	External Release of NASA Software
NPR 4300.1A	NASA Personal Property Disposal Procedural Requirements
NPR 4310.1	Identification and Disposition of NASA Artifacts
NPR 7120.5D	NASA Space Flight Program and Project Management Requirements
NPR 8553.1A	NASA Environmental Management System (EMS)
NPR 8580.1	Implementing The National Environmental Policy Act And Executive Order 12114
NPR 8800.15A	Real Estate Management Program Implementation Manual
P.L. 109-55	NASA Authorization Act (2005)
P.L. 110-161	Consolidated Appropriations Act (2008)

2.1.1. DOCUMENT STRUCTURE

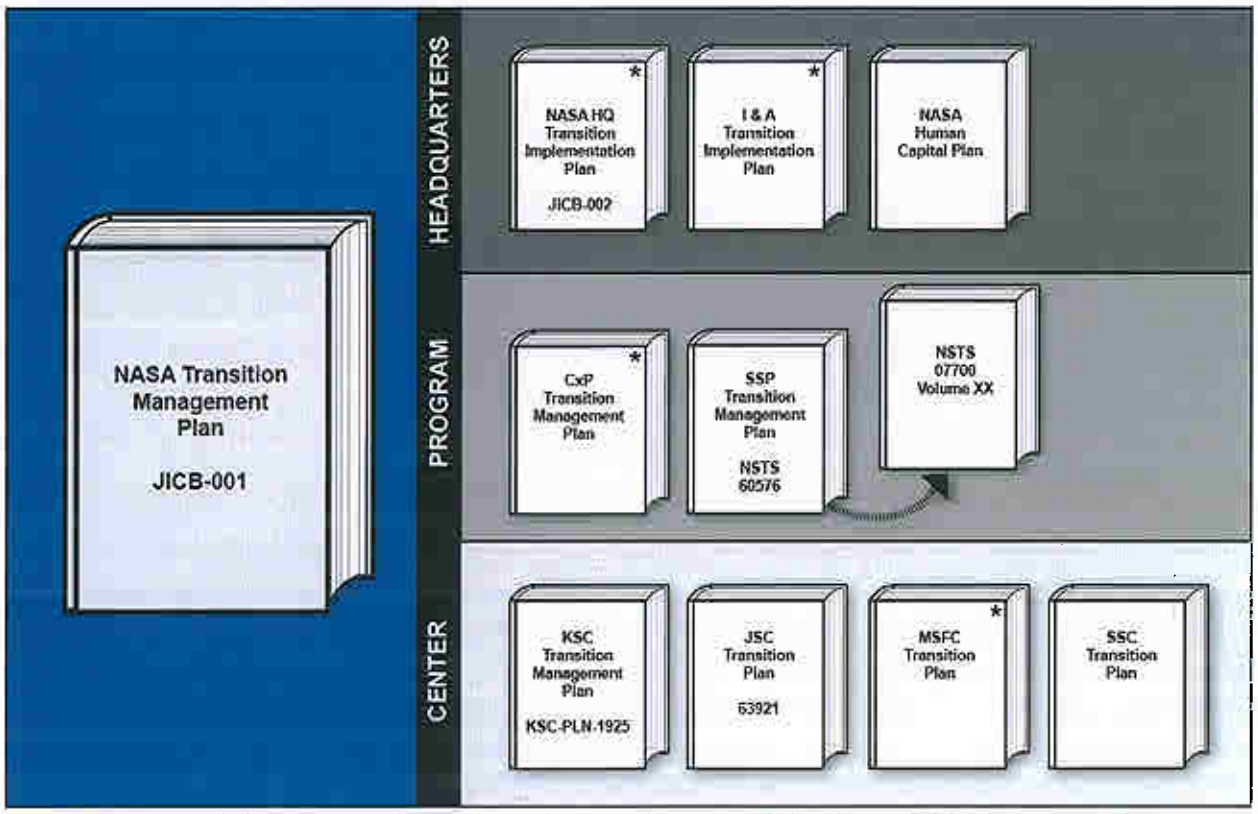
Figure 2 illustrates the planned Transition document structure.

NASA Transition is not a separate program or project, but rather a crosscutting, Agency-wide activity that is managed consistent with the intent of NPR 7120.5D, NASA Space Flight Program and Project Management Requirements. This document provides high-level Agency goals and objectives for this activity and describes the overall structure for managing NASA Transition. The NASA Transition Management Plan will be supplemented by the NASA Transition Implementation Plan (JICB-002), which will

provide Level I Transition requirements to the Programs and Institutions for Phase I. The NASA Transition Implementation Plan will be released in December 2008. The NASA Infrastructure and Administration (I&A) Transition Implementation Plan and the NASA Human Capital Plan are derived from the NASA Transition Management Plan and NASA Transition Implementation Plan and provide additional details on requirements and management processes in those specific areas.

These Level I documents govern the program and Center institutional plans at Level II. The Shuttle Program Transition Management Plan (NSTS 60576) and pending Constellation Program Transition Management Plan are both supporting documents outlining the detailed programmatic execution and responsibilities associated with the broader NASA Transition Management Plan for the programs at Level II. ISSP STaR plans have been incorporated into that program's technical baseline including the ISSP Operating Document. The Center Transition Management Plans for Kennedy Space Center (KSC), Johnson Space Center (JSC), Marshall Space Flight Center (MSFC), and Stennis Space Center (SSC) capture the Center and institutional Transition requirements and interfaces. Additional Transition implementation plans are also developed, as appropriate, at Level III for relevant elements of SSP, ISSP, and CxP, as well as within the affected Center organizations.

Collectively (and along with the guidance and direction provided by HQ as part of the annual Planning, Programming, Budgeting, and Execution [PPBE] process), these documents provide the basis on which NASA Transition activities are governed and executed.



(Note: Not all documents shown have been written as of the date of this document; * denotes a pending document)

Figure 2. Transition Document Structure

2.2. GOVERNANCE STRUCTURE

The diagram in Figure 3 graphically depicts the specific governance structure, associated board processes, and Headquarters-Center relationships in NASA Transition. The diagram is focused on the processes that feed directly into the Headquarters (HQ)-level decision-making authorities and does not include the multiple, crosscutting activities that are used to coordinate activities between the Programs and the Centers at Level III and below. For more on coordination at Level III and below, see the Program and Center Transition plans referenced in Figure 2.

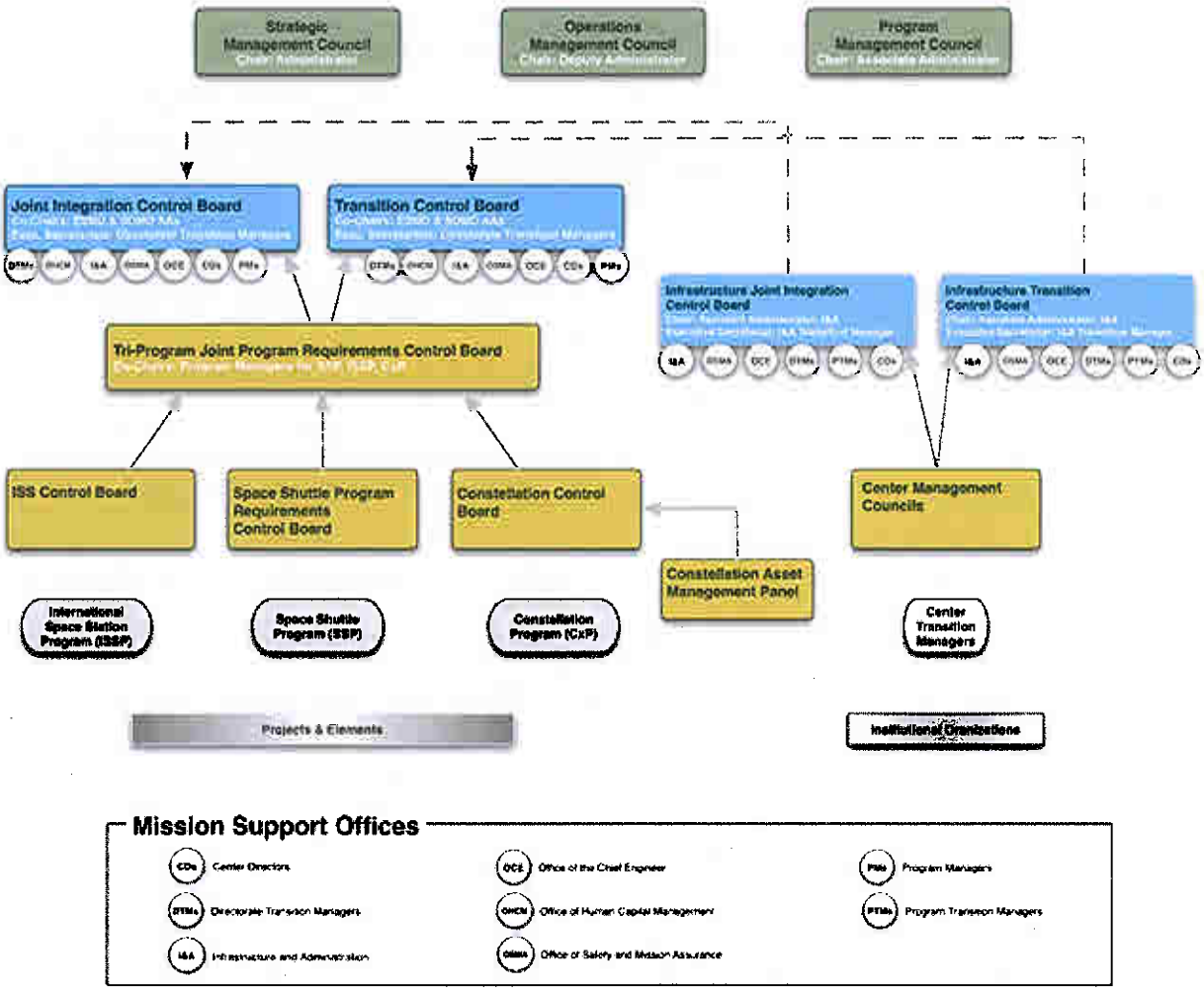


Figure 3. Specific Governance Structure, Associated Board Processes, and Headquarters-Center Relationships for NASA Transition Joint Decision Making

2.3. AGENCY MANAGEMENT COUNCILS

2.3.1. STRATEGIC MANAGEMENT COUNCIL (SMC)

The SMC sets the Agency's strategic direction and assesses Agency progress at the overall Vision and Mission level. Details are provided in NPD 1000.0.

2.3.2. Operations Management Council (OMC)

The OMC reviews and approves institutional plans. Details are provided in NPD 1000.0.

2.3.3. Program Management Council (PMC)

The PMC baselines and assesses program performance. It reviews and approves programs and projects. Details are provided in NPD 1000.0.

2.4. Control Boards

2.4.1. Joint Integration Control Board (JICB) and Transition Control Board (TCB)

At the HQ level, the JICB and the TCB are cochaired by the Associate Administrators (AAs) for SOMD and ESMD, with the Directorate Transition Managers acting as the JICB and TCB executive secretariats and jointly conducting the meetings. These Directorate-level interorganizational forums are chartered to ensure successful integration of development with operations in support of the Exploration architecture, which is leveraged from the knowledge, capabilities, and demonstrated performance derived from over 40 years of spaceflight experience. In addition to personnel from ESMD and SOMD, key members include the Office of I&A, Office of Safety and Mission Assurance (OSMA), Office of Chief Engineer (OCE), Office of Procurement, program/project managers, and Center Directors.

The JICB promotes an integrated overarching perspective, drawing on key cross-Directorate, Center, and program leadership to: ensure integrated strategic direction and decision making; approve integrated priorities and risk mitigation strategies; and, approve budgetary, schedule, and top-level development and operation requirements.

The TCB serves as a collaborative, tactical, decision-making body focused on disposition of SSP resources in accordance with future Exploration needs. The TCB conducts three types of briefings: decision making, information-only, and review of previous actions.

2.4.2. Infrastructure Joint Integration Control Board (iJICB) and Infrastructure Transition Control Board (iTCB)

The Assistant Administrator for I&A chairs the iJICB and iTCB as analogs to the JICB and TCB, with the I&A Transition Manager conducting the meetings as executive secretary. These interorganizational forums are chartered to coordinate infrastructure planning and institutional resource requirements in accordance with the evolving institutional support requirements of future programs, and the imminent divestment of an extensive assortment of assets upon SSP retirement. Key members include Office of I&A, OSMA, OCE, Directorate and Program Transition Managers, Deputy Center Directors, and Directors of Center Operations.

2.4.3. Tri-Program Joint Program Requirements Control Board (JPRCB)

2.6.1.1. Exploration Systems Mission Directorate

ESMD is responsible for creating and supporting a suite of new capabilities to enable human exploration of our Solar System. Throughout a successful Transition, ESMD will take on a significant portion of the SSP's assets as it retires and ESMD's Cx suite becomes active.

Within ESMD, the CxP is responsible for developing and providing life-cycle support for capabilities required to continue human spaceflight activities post-Shuttle retirement including transportation systems used to carry humans to the ISS, Moon, Mars, and beyond. The Design Development Test & Evaluation portfolio contains a cadre of systems, including a Crew Exploration Vehicle (Orion), launch transportation systems (Ares I and V), lunar (Altair), and planetary body exploration systems, in-space support systems, and ground-based support systems. The ESMD portfolio also includes some robotic missions to the Moon and research payloads that use the ISS, as well as ground-based experimental facilities.

Within ESMD, there are five programs: CxP, Commercial Crew and Cargo Program Office, Lunar Precursor Robotic Program (LPRP), Human Research Program (HRP), and Exploration Technology Development Program (ETDP).

2.6.1.2. Space Operations Mission Directorate

SOMD is responsible for NASA space operations related to exploration in and beyond LEO, with special emphasis on human activities in space. The SOMD is responsible for Agency leadership and management of NASA space operations related to launch services, space transportation, space communications and navigation, large-scale flight testing, and rocket propulsion testing in support of human and robotic exploration requirements. Within SOMD, there are five programs: the SSP, ISSP, Launch Services Program (LSP), Space Communications and Navigation (SCaN) Program, and Rocket Propulsion Test Program (RPTP).

2.6.1.3. ESMD/SOMD/I&A Transition Managers

The ESMD and SOMD Transition Managers are responsible to their respective Mission Directorate AAs for the day-to-day execution of NASA Transition activities. Together with the I&A Transition Manager, they share lead responsibility for developing Agency-level Transition processes, organizations, and structure. Ultimately, the AAs for ESMD and SOMD have final Transition decision-making authority.

The HQ Transition Managers and their support staff focus their oversight on the selection and disposition of Shuttle assets and leveraging the use of existing facilities, personnel, processes, and tools within ESMD. In addition, the Transition Managers are responsible for comprehensive integration and communication across all affected HQ Directorates and Offices due to the distributed nature of the Transition activities.

2.6.2. Headquarters Mission Support Offices

The HQ Mission Support Offices provide functional oversight and administrative support to the Agency's missions and manage resources to efficiently accommodate fulfillment of Agency objectives, goals, and milestones.

2.6.2.1. Office OF Infrastructure and Administration

The Office of I&A provides oversight of Agency infrastructure and management of aircraft, environmental, facilities engineering, real and personal property, logistics, and strategic capabilities assets. The Office of I&A is the final authority for disposition of excess SSP and ISSP assets and infrastructure, which translates into a significant role in the Transition community. The Office of I&A participates in the integrated Shuttle Transition planning for infrastructure that identifies desired outcomes, goals, milestones, integration processes, priorities, and overall requirements and resources.

2.6.2.2. Office of Human Capital Management

The OHCM translates NASA's business strategy into world-class workforce capabilities, maximizes NASA employees' contributions toward the organization's success, collaborates with NASA leadership in making cultural and organizational changes, and provides human resource expertise, using a corporate perspective, to meet Federal and Agency objectives and requirements. As such, the OHCM provides integration and coordination of workforce planning activities throughout the various Transition timeframes, including appropriate skills identification and mapping projections.

2.6.2.3. Office of procurement

The goal of the Office of Procurement is to ensure the Agency executes its mission successfully by effectively and efficiently managing the acquisition process. Throughout the Transition timeframes, Procurement's objectives are to continuously improve the Agency acquisition process, anticipating evolving Agency needs with particular attention to improving contract management; and, to develop the people (and related infrastructure) geared to aggressively pursue the acquisition opportunities and challenges the Agency faces in the decades to come.

2.6.3. Administrator Staff Offices

2.6.3.1. The Office of Safety and Mission Assurance

The OSMA is an Administrator Staff office that provides policy direction, functional oversight, and assessment for all Agency safety, reliability, maintainability, and quality engineering and assurance activities, serves as the agency technical authority for all system safety reliability and quality standards and requirements, and is a principal advisory resource for the Administrator and other senior officials on matters pertaining to safety and mission success. OSMA is a permanent member of the Transition board structure to ensure the incorporation of safety considerations and risk management best practices in the Transition decision processes.

2.6.3.2. Office of the Chief Engineer

The OCE provides policy direction, oversight, and assessment for NASA engineering and program/project management and is the Agency technical authority for all engineering processes, standards, and requirements. OCE is a permanent member of the Transition board structure to ensure the engineering integrity of the Transition decision processes.

2.6.3.3. Program Analysis and Evaluation

PA&E is a staff office supporting the Administrator, Deputy Administrator, Associate Administrator, and Chief of Staff. PA&E participates in the Transition board structure to bring an Agency-wide strategic perspective to the Transition process and, as required, provide an independent assessment of Transition activities for the Administrator.

2.6.3.4. The Office of Program and Institutional Integration

The OPII is a staff office supporting Agency senior leadership chartered with harmonizing and jointly advising decisions related to both program execution and institutional responsibilities in the Transition related areas of technical capabilities, workforce, joint infrastructure, and shared funding.

2.6.4. Centers

The SSP sustainment and operations activities are hosted primarily by the JSC, KSC, MSFC, and SSC, with significant efforts also at Michoud Assembly Facility (MAF) and White Sands Test Facility (WSTF). With the development of new Exploration capabilities, work is being shared across all ten NASA Centers according to skills, expertise, core competencies, availability, and capacity. As a result, the impact of Transition is expected to vary among the Centers and requires local management of issues particular to individual Centers. Affected NASA Centers are engaged in Transition to the extent that they must adequately plan and implement asset disposition and transfer, facility utilization, and workforce migration. Centers are encouraged to conduct Center-focused Transition planning and apply resources to implementation strategies, as necessary.

2.6.5. Programs

The primary programs dealing with the near-term Transition activities are the SSP, ISSP, and CxP, and to a lesser extent, the Commercial Crew and Cargo Program (C3P). All of the other programs within the SOMD/ESMD portfolios are potentially impacted by SSP retirement and are engaged, as appropriate, in the NASA Transition effort.

2.6.5.1. Space Shuttle Program

SSP T&R is managed within the SSP (Level II) Business Office and the SSP Management Integration & Planning Office. The SSP tracks budget, schedule, and management activities associated with the end of the program, using accepted program and configuration management principles consistent with the intent of NPR 7120.5D. Work is planned and accomplished according to the baseline Transition Work Breakdown Structure (T-WBS), which is provided in Appendix B.

All budgets are developed on an annual basis through the standard Agency PPBE process, in response to enhanced Transition-specific guidance. The governance and organization structure for executing T&R post-FY 2010 is under development.

2.6.5.2. International Space Station Program

The ISSP fully participates in the planning and implementation of Transition activities to ensure coordinated assessment of assets, facilities, and capabilities throughout the Transition continuum. ISSP shall budget for impacts resulting from STaR via the annual

Agency PPBE process. It manages implementation of STaR requirements through the established ISS program work breakdown and control account structures. This is done in accordance with established budget, configuration management, and procurement processes administered by standing ISS Program boards and panels.

2.6.5.3. Constellation Program

The implementation of Transition-related activity for the CxP shall be managed by the Cx Transition Manager. In many cases, Transition activities are consistent with the developmental program management activities already being accomplished by the program and projects. However, Transition-related workforce, infrastructure, property transfers, schedule deconfliction, industrial base, and risk management are specifically tracked and reported within the CxP, as appropriate. This enables implementation of corrective actions necessary to accomplish development and Transition objectives.

The CxP tracks budget, schedule, and management activities in conjunction with the SSP Business and Management & Integration offices, using accepted program and configuration management principles consistent with the intent of NPR 7120.5D. Work is accomplished consistent with the CxP Integrated Master and the MPIM Schedules, which are updated and certified on a quarterly basis, and the T-WBS provided in Appendix B. All budgets are developed through the standard PPBE processes on an annual basis with accommodation for specific Transition-related guidance.

2.6.5.4. Commercial Crew and Cargo Program

The Commercial Crew and Cargo Program Office (C3PO) manages Commercial Orbital Transportation Service (COTS) capability demonstration projects, referred to as Phase I. C3PO pursues funded and non-funded Space Act Agreements (SAAs) with companies to demonstrate orbital spaceflight capabilities. These demonstrations of capability will occur between 2008 and 2010. The COTS Phase I demonstrations are being managed by ESMD. Excess property from SSP disposition activities that is not needed by the CxP is prioritized and evaluated for applicability to C3PO activities where benefit to the Government may occur in order to further enable overall COTS success.

Once a capability is successfully demonstrated, the Agency plans to purchase these services competitively. This is referred to as ISS Commercial Resupply Services (CRS), which will be managed by SOMD. As commercial enterprises turn the journey to LEO into a profit-making business model, NASA will be able to focus on goals that are more appropriate for Government, such as exploring the Moon and Mars.

As the Exploration program unfolds, NASA's partnerships with the commercial space industry may ultimately extend beyond meeting the needs of the ISS and LEO to support future Exploration ventures to the Moon, Mars, and beyond.

3. STRATEGIC PLANNING

Leveraging the Agency's rich human and robotic spaceflight experience for the benefit of sustainable exploration of the Moon, Mars, and beyond.

Comprehensive and careful Transition planning is critical to the future success of NASA's programs and projects. Leveraging the Agency's robust human and robotic spaceflight program experience base will provide optimal benefit to Exploration.

Transition involves strategic planning and tactical implementation of a well defined set of requirements in order for NASA to evolve from its current operations and sustaining engineering focus to more streamlined future operations, with an additional emphasis on design, development, and testing of new systems. This evolution will lead to deployment of these new systems on a recurring basis, consistent with the phased approach of the Exploration architecture, each of which requires a development-to-operations transition for successful implementation. NASA uses existing processes and key functions where appropriate while still affecting fundamental change in the Agency's mission.

The SSP, ISSP, and CxP are each in different life-cycle phases as defined in NPR 7120.5D. As such, the Transition activities conducted within each program are managed consistent with the intent of NPR 7120.5D processes applicable to that phase. The program activities are integrated within the established Transition management processes.

Not only must NASA address Space Shuttle hardware disposition and workforce utilization but, at the same time, it must manage and mitigate the associated impacts to the ISSP, C3P, CxP, and their projects. Decisions must be made regarding which facilities, hardware, personnel, tools, and processes will be needed for the new programs, in addition to determining what additional burdens will be realized by the existing programs, along with the new programs. After 2010, the Agency will need to disposition residual assets and resources left behind by the SSP. This activity could have significant negative impact on the remaining programs unless the effort is properly planned and executed appropriately.

Many of the heritage SSP assets, infrastructure, and experienced personnel will form key elements of the overall Exploration architecture. For some elements of Cx, the Shuttle-derived Exploration architecture and associated Shuttle hardware were found to be more affordable, safe, and reliable than other approaches. In turn, this provides an opportunity for a relatively smooth transition of these existing facilities and experienced workers to ensure lower schedule, life-cycle cost, industrial base, workforce, and programmatic risks.

3.1. AGENCY STRATEGIC GOALS

The 2006 NASA Strategic Plan (NPD 1001.0) specified six strategic goals for the Agency, including retiring the Space Shuttle no later than 2010 (Strategic Goals 1 and 2) and the development of a new Crew Exploration Vehicle (now named Orion) as soon as possible after Shuttle retirement (Strategic Goal 4).

Strategic Goal 1: **Fly the shuttle as safely as possible until its retirement, not later than 2010.**

Strategic Goal 2: **Complete the International Space Station in a manner consistent with NASA's International Partner commitments and the needs of human exploration.**

Strategic Goal 3: **Develop a balanced overall program of science, exploration and aeronautics consistent with the redirection of the human spaceflight program to focus on exploration.**

Strategic Goal 4: **Bring a new Crew Exploration Vehicle into service as soon as possible after Shuttle retirement.**

Strategic Goal 5: **Encourage the pursuit of appropriate partnerships with the emerging commercial space sector**

Strategic Goal 6: **Establish a lunar return program having the maximum possible utility for later missions to Mars and other destinations.**

3.2 TRANSITION GOALS AND OBJECTIVES

Two Transition goals were developed to align the NASA Transition effort with the Agency strategic goals for the primary purpose of achieving successful implementation of the Exploration architecture. Specifically, those Transition goals and objectives that support the Agency strategic goals are described in the following section.

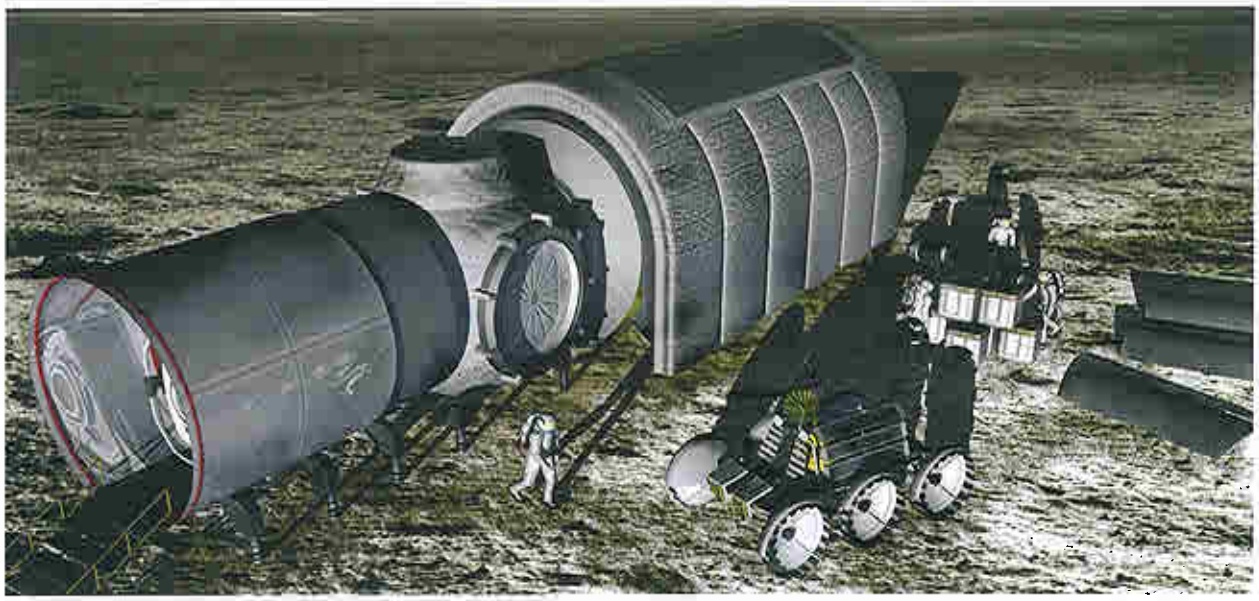
Transition Goal 1: **Enable more efficient and more cost-effective human spaceflight capabilities in pursuit of space exploration through maximized leverage of Shuttle assets.**

Objective 1.1	Plan and implement transition activities that have minimal impact to the risk posture and safe execution of SSP, ISSP, and Constellation Program (Cxp).
Objective 1.2	Provide accurate, timely, and effective information to transition stakeholders.
Objective 1.3	Disposition property as it is no longer needed in a safe and environmentally sound manner, considering budget and resources.
Objective 1.4	Preserve technical, programmatic, and cultural legacy of SSP, ISS, and CxP consistent with Federal statutes, regulations, and Presidential Directives while still driving for efficiency and cost effectiveness in these tasks.
Objective 1.5	Leverage SSP assets and exploration synergies in support of ISS service requirements to promote greater commercial activity in Leo.

Transition Goal 2: Optimize workforce, institutional, and industrial capabilities to meet current and future exploration mission needs.

Objective 2.1	Maintain SSP and ISSP critical skills in order to ensure successful completion of the manifest and operations.
Objective 2.2	Develop ESMD workforce profile that takes advantage of workforce availability, phased by time and geographic location.
Objective 2.3	Identify, leverage, and optimize existing Agency capabilities, assets, and facilities, where beneficial, to provide flexibility and robustness to meet present and future exploration needs.
Objective 2.4	Maintain the integrity and viability of NASA's aerospace industrial base to meet present and future exploration needs.

4. PERFORMANCE PLANNING & MANAGEMENT



A successful Transition will preserve the Agency's critical skill base and core competencies, enabling a challenging and dynamic Exploration mission.

NASA Transition planning takes into account the Transition continuum, which spans three primary time phases: present to FY 2010, FY 2011-2015, and FY 2016 and beyond. Consistent with the NASA Authorization Act of 2005, NASA's top priority is safely flying the remaining SSP flights to allow final assembly of the ISS, while simultaneously preparing to bring our new U.S. spaceflight capabilities online as soon as possible. To achieve success in these mission areas, Transition is a key driver for NASA workforce and skill-mix utilization, infrastructure and asset planning, and integrated budgeting and scheduling.

Given the scope of the Transition and retirement activities, Transition leadership is focused on integrating these three key areas: (1) Workforce, (2) Infrastructure, Facilities, and Property, and (3) Planning and Control.

4.1. WORKFORCE MANAGEMENT AND HUMAN CAPITAL

The Agency's overarching goal is to preserve its critical skill base, ensure the viability of its core competencies, and execute its challenging, dynamic, and evolutionary Exploration mission. NASA approaches workforce transition through cooperation among the OHCM, ESMD, SOMD, the programs (SSP, ISSP, CxP, C3P), the Centers, and industry.

The CxP vehicles and ground and flight operations paradigms are such that the vehicle is a smaller, simpler design. This design leverages proven, heritage vehicle elements, while at the same time incorporating technical, operational, and processing improvements that will substantially reduce the operations workforce requirements for both variable and fixed cost needs.

Likewise, NASA is shifting from a primary mode of operations and sustaining engineering on two major legacy systems, to a continuum of Exploration transitions from recurrent development activities (Ares I/Orion; Ares V, Lunar Lander, Lunar Habitat, and beyond) and to an expanding operations portfolio. Future needs will continuously include Design Development, Test and Evaluation (DDT&E) and operations/sustaining engineering performance capabilities. The ISSP workforce impacts are also being studied. Workforce allocation and alignment with progressive development will be crucial to success.

With specific respect to the workforce, the workforce profile for civil servants is expected to be relatively unvarying (flat), with any reductions being due to typical attrition, including retirement. The contractor workforce, which comprises 60 to 80 percent of the NASA team, will be more affected, but the impact will depend upon the geographic, demographic, and skill set attributes of the personnel. Additional details can be found in the NASA Workforce Transition Strategy Initial Report, March 2008, submitted to the Congress as required by P.L. 110-161 and available on the NASA Transition Web site (http://www.nasa.gov/transition). Subsequent NASA Workforce Transition Strategy reports will be submitted at six month intervals.

Several integrated approaches are being concurrently pursued including: retraining, retention bonuses, workforce synergy (workforce sharing among two or more programs), Shuttle to Constellation workforce mapping, workforce technical interchange meetings, NASA workforce information cubes, modeling and simulation tools, legislative and administrative tools support, program requirements forecasting, and human spaceflight

capabilities workforce need and gap analysis. NASA is also pursuing further benchmarking of Department of Defense and industry closeout activities, intending to incorporate lessons learned and management best practices as they apply to workforce transition.

Workforce management remains one of the top Transition challenges. NASA's Transition approaches provide detail from which to develop integrated planning and mitigation efforts.

4.1.1. Communications

Transition communication is focused on open dissemination of plans and activities, in addition to aggressive pursuit of feedback from the affected workforce. All organizations impacted by the NASA Transition are responsible for regular communication of Transition activities with their workforce. Coordinated efforts among HQ, the Centers, and the programs ensure that comprehensive timely information is being distributed efficiently. It is incumbent on each organization to monitor the effectiveness of communication efforts and make improvements as required. Specifically, for the near-term, NASA, at all levels, has employed a comprehensive communication plan that engages SSP, ISSP, and CxP and promotes the accomplishments of the past and the potential of the future.

Transition communication also extends beyond the workforce to include a variety of external stakeholders. It is incumbent upon both ESMD and SOMD to inform stakeholders of progress as appropriate. This may include a Transition summit, Transition road shows, Transition town hall meetings, Transition talking points, media events and content, Congressional testimony, and Agency forums.

4.1.2 Industry Cooperation

Industry shall be an integral player in NASA Transition planning, particularly in workforce Transition planning. As Transition progresses, there will be continuing dialogue with industry to explain Transition plans, solicit input, and share concerns. This input is factored into Transition plans, as appropriate.

4.2 INFRASTRUCTURE DISPOSITION

The infrastructure base currently used by the SSP is both sizeable and widely distributed. Components of that SSP infrastructure, including both real and personal property, must be dispositioned and either excessed or transferred to other programs. Accordingly, it is prudent to have an integrated strategy for the disposition of SSP property to achieve the most cost-effective approach and minimize the potential resource impact to the missions of the Agency.

The SSP shall ensure that sufficient resources are applied for proper accounting of both real and personal property prior to SSP retirement. This includes a descriptive inventory of all items, as necessary, to enable effective property disposition planning by I&A and the affected Centers. The exact organizational responsibility to disposition property remaining after the Shuttles' last mission in 2010 has not yet been determined by NASA.

The SSP determines the dates at which SSP assets and capabilities are no longer needed and can be dispositioned. These are documented in the SSP Transition Master Schedule. Exploration programs (particularly CxP, but also C3PO) determine the dates at which assets and capabilities currently used by SSP will be needed for use in the Cx systems' development and identify in a timely manner those first need dates.

Conflicts between need dates (i.e. gaps and overlaps) shall be adjudicated through the Transition board structure. Affected Centers coordinate with the Programs, Mission Directorates, and I&A to provide information on the anticipated usage of institutional assets across the Agency. This includes their anticipated usage by SSP, Exploration programs, and others. Additionally, the SSP, in close coordination with HQ organizations, shall identify appropriate end-state requirements for major elements of the program that will be preserved.

For property that is determined to be excess to the needs of NASA, policies and procedures are in place to handle the disposition. Personal property and assets are handled in accordance with the versions of NPD 4300.1 and NPR 4300.1 in effect at the time of disposition. Real property is handled in accordance with the versions of NPD 8800.14 and NPR 8800.15 in effect at the time of the decision of disposition, with utilization and disposition plans and processes coordinated through, and approved by, the Headquarters-level Facilities Program Board.

The NASA Transition Management Plan complies with all policies, rules, and regulations via NASA procedures, including the latest versions of NPR 2190.1, NPR 2200.2, NPR 2210.1, NPR 1600.1, and NPD 2110.1 unless specific waivers, deviations, or exceptions are granted by the appropriate approval authorities.

4.2.1 Environmental Management

In accordance with the National Environmental Protection Act, SSP has conducted, and publicly provided the results of, a Programmatic Environmental Assessment, that evaluates alternatives for property disposition as the result of SSP retirement. Similarly, CxP has conducted, and publicly provided the results of, a Programmatic Environmental Impact Statement, inclusive of potential impacts and mitigations associated with implementing CxP.

Environmental management issues and risks (e.g. permits, approvals) that are identified as part of the Transition planning will be managed in accordance with NASA environmental policies and procedures and applicable Federal, State, and local laws and regulations in effect at the time of property disposal.

For more information, see NPD 8500.1A, NPR 8553.1A, and NPR 8580.1.

4.2.2 Historic Preservation

Because of the SSP's national and international importance to human spaceflight history and its significant contributions to States and cities through its NASA Centers and contractor activities, NASA is responsible for ensuring the proper documentation of the SSP's history and contributions. This includes disposition of artifacts consistent with the

intent of NPR 4310.1, Identification and Disposition of NASA Artifacts, as applied to NASA, that are unique objects that document the history of the science and technology of aeronautics and astronautics. Their significance and interest stem mainly from their relation to the following: historic flights, programs, activities, or incidents; achievements or improvements in technology; our understanding of the universe; and important or well known personalities.

NASA is also responsible for compliance with the National Historic Preservation Act in the U.S. Code (16 U.S.C. §§ 470 et. Seq.), which directs Federal agencies to inventory and maintain properties of historic significance. The term historic property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register of Historic Places, including artifacts, records, and material remains related to such a property or resource. Historical capture and preservation of NASA Transition activities shall be accomplished to the maximum reasonable extent possible via use of Public Affairs, History Offices, and data and records management per NASA requirements.

A significant effort will be required to properly disposition data and records acquired over the 30+ years of the Space Shuttle Program. Planning is consistent with the intent of NASA NPD 1440.6G, NASA Records Management, and NPR 1441.1D, NASA Records Retention Schedules. WGs have been created to address specific records and data retention issues.

4.2.3 Security Planning

NASA security processes apply and are particularly important given the volume of assets and information to be processed. Standard NASA program and systems security processes and guidelines apply. For more information, see NPR 1600.1.

4.2.4 Export Control

No separate export control plans are anticipated, although all NASA policies and procedures for export and International Traffic in Arms Regulations control are applicable and additional resources may be required. Additional export control guidance may be provided in the I&A Transition Implementation Plan (to be written), and the SSP Transition Management Plan, NSTS 60576. The disposition of personal property is coordinated with NASA Export Control Offices to ensure compliance with all relevant export control laws. For more information, see NPD 2110.1E and NPD 2190.1A.

4.3. Planning and Control

Primary planning areas for NASA Transition include budget planning and coordination, environmental management, export control, historic preservation, human capital, information technology, management, personal property, real property, records, and technical management. The three major human spaceflight programs and the Mission Directorates must maintain close working relationships in order to facilitate communications, ensure effective knowledge transfer, efficiently disposition assets for Transition, and coordinate work at all of the NASA Centers and among the necessary institutions. At all levels, standing control boards have been established to provide insight and guidance, and to facilitate decisions on important Transition issues.

Budget planning for Transition activities is incorporated into the standard Agency PPBE process through the issuance of Transition-specific guidance that flows from the Agency strategic planning guidance, through the Directorate program and resources guidance documents, to the executing programs. All parties participating or affected by NASA Transition are encouraged to vigorously pursue cost avoidance and find real savings in both cost and schedule in the operations of heritage systems and the development of new systems. This will be the critical factor in the successful transition from the SSP capabilities to the CxP.

NASA is developing detailed budget plans for Space Shuttle Transition and Retirement activities in fiscal years 2011 and 2012 as part of the 2010 Agency PPBE process. Those plans will be provided in future versions of this management plan.

4.3.1. Configuration Management Planning

The TCB and JICB Charters, MPIM schedule, and NASA Transition Management Plan documents are under HQ configuration management.

4.3.2. Technical, Schedule and Cost Control Methodology

For the purpose of NASA Transition planning, technical, schedule, and cost control are considered to apply to the detailed Transition assessments and the decisions made about Transition. Life-cycle cost analysis shall be applied and evaluated for all Transition decisions.

4.3.3. Risk/Knowledge Management and Metrics

Transition risks are documented and managed by SOMD and ESMD consistent with NASA's continuous risk management process. All Transition decisions shall be risk-informed and appropriate mitigations applied per existing processes. HQ, SSP, ISSP, CxP and C3PO shall develop and track metrics to measure the progress and efficiency of Transition activities. Additionally, robust knowledge management incorporating lessons learned database activities are a key part of Transition leadership and management.

4.3.4. Procurement Strategy

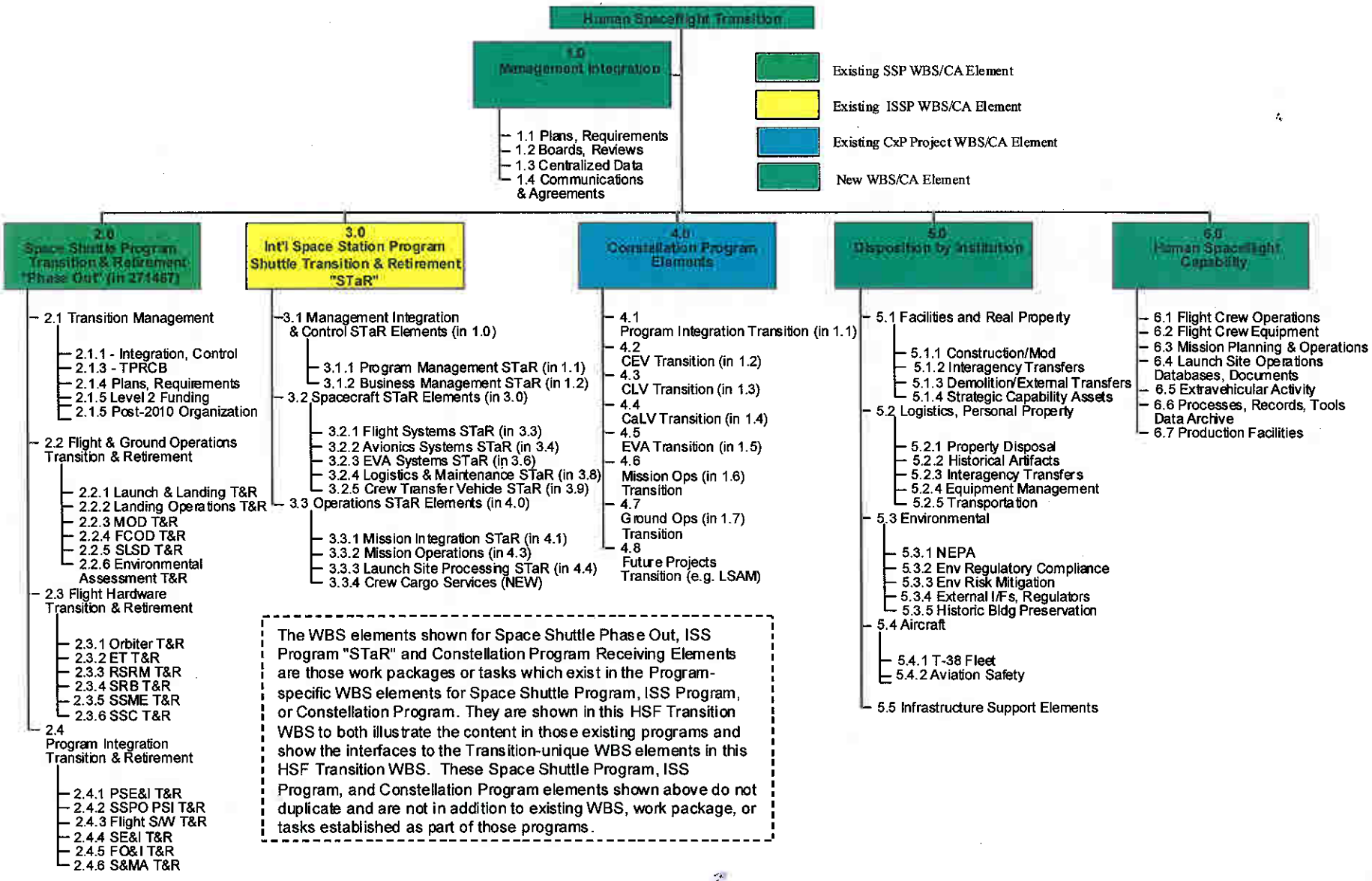
The Agency-level Procurement Tenants (8/1/2008) shall be complied with in all phases of Transition acquisition. This includes an emphasis on earned value management (where applicable), maximized full and open competition, common systems and standard interfaces, a flow down of safety requirements and a zero-based requirements development approach for other requirements, and a shift from cost type contracts to firm fixed price as we transition from the DDT&E phase to the production phase of the acquisition lifecycle.

5. Conclusion

Transition represents a series of strategic challenges that are influenced by the interaction of people, organizations, processes, regulations, ongoing tactical decisions, external drivers, technology, and the interconnections between different events. To ensure success, NASA has initiated an Agency-wide Transition approach, led by a joint team from ESMD, SOMD, and I&A. Working through formalized Control Board processes, the Agency is responsibly managing decisions in a way that optimizes opportunities for success in the retirement of the SSP and implementation of the CxP. The plan emphasizes best practices, sound program management guidance, and robust systems engineering principles to effectively implement Transition activities.

APPENDIX A: ACRONYMS

ACRONYM	DESCRIPTION
AA	Associate Administrator
C3P	Commercial Crew and Cargo Program
C3PO	Commercial Crew and Cargo Program Office
CIO	Chief Information Officer
COTS	Commercial Orbital Transportation Services
CRS	Commercial Resupply Services
Cx	Constellation
CxCB	Constellation Control Board
CxP	Constellation Program
DDT&E	Design Development, Test, & Evaluation
DoD	Department of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESMD	Exploration Systems Mission Directorate
ETDP	Exploration Technology Development Program
HRP	Human Research Program
HQ	Headquarters
HQTWG	Headquarters-level Transition Working Group
I&A	Infrastructure and Administration
ISS	International Space Station
ISSP	International Space Station Program
iJICB	infrastructure Joint Integration Control Board
iTCB	infrastructure Transition Control Board
JICB	Joint Integration Control Board
JPRCB	Joint Program Requirements Control Board
JSC	Johnson Space Center
KSC	Kennedy Space Center
LEO	Low-Earth Orbit
LPRP	Lunar Precursor Robotic Program
LSP	Launch Services Program
MAF	Michoud Assembly Facility
MPIM	Multi-Program Integrated Milestones
MSFC	Marshall Space Flight Center
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
OCE	Office of the Chief Engineer
OHCM	Office of Human Capital Management
OMC	Operations Management Council
OSMA	Office of Safety and Mission Assurance
PA&E	Program Analysis and Evaluation
PMC	Program Management Council
PPBE	Planning, Programming, Budgeting, and Execution
PRCB	SSP Program Requirements Control Board
RPTP	Rocket Propulsion Test Program
SAA	Space Act Agreement
SCP	Space Communications Program
SMC	Strategic Management Council

ACRONYM	DESCRIPTION
SOMD	Space Operations Mission Directorate
SSC	Stennis Space Center
SSP	Space Shuttle Program
STaR	ISS Shuttle Transition and Retirement
T&R	Transition and Retirement
TCB	Transition Control Board
T-WBS	Transition Work Breakdown Structure
U.S.	United States
WBS	Work Breakdown Structure
WG.	Working Group
WSTF	White Sands Test Facility

Work Breakdown Structure for Human Spaceflight Transition Activities