



## **NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

### **HUMAN CAPITAL PLAN FOR MISSION EXECUTION, TRANSITION, AND RETIREMENT OF THE SPACE SHUTTLE PROGRAM**

April 14, 2006

## EXECUTIVE SUMMARY

NASA has prepared this Space Shuttle transition personnel plan, pursuant to the requirements of Section 502 (c) of the National Aeronautics and Space Administration Authorization Act of 2005 (P. L. 109-155). Section 502 (c) directs NASA to “develop a transition plan for any Federal and contractor personnel engaged in the Space Shuttle program who can no longer be retained because of the retirement of the Space Shuttle.”

NASA is committed to implementing effective ways to transition the Space Shuttle workforce while retaining the skills necessary to safely fly-out the Space Shuttle program through its retirement no later than 2010. The Space Shuttle program is committed to:

- Ensuring safe and successful mission execution as the top program priority.
- Maintaining a capable and committed civil service and contractor workforce for mission execution by ensuring critical skills are available when needed.
- Managing the workforce transition process in a way that balances Agency/Space Shuttle program and employee needs.

NASA has established key principles that will serve as a framework as we move forward:

- The program intends to conduct an orderly phase out and transition of the Space Shuttle workforce.
- NASA will capitalize on the potential of the Shuttle workforce by using existing skills – enhancing and transitioning them to future programs where possible.
- This effort will be managed at the project/element level because of the unique applicability of each project element to future systems, with a high degree of coordination and integration with Agency and Mission Directorate workforce planning and assessment activities.

The NASA Administrator has testified before Congress that the transition from the Shuttle is NASA’s greatest management challenge over the next several years. Because the transition spans multiple Mission Directorates, accountability for an effective transition rests with top Agency management, supported by program and project managers in each Mission Directorate and line managers at the NASA Centers. Transition issues are complex and, therefore, transition planning will be an iterative, evolutionary process requiring tight integration between current operators and the teams involved in developing new exploration systems.

NASA has a wide range of workforce management tools available for balancing the needs of retaining Space Shuttle workforce through mission execution while beginning the workforce transition process. The decision to use Shuttle-derived propulsion elements as the basis for future exploration transportation systems creates the primary opportunity for maintaining critical workforce skills in the Space Shuttle program. Management tools to capitalize on the common architecture and space flight development experience in the Space Shuttle program include providing charge codes for Shuttle employees who work on development programs, implementing contract changes to allow matrix support by contractor employees between programs, and initiating a program review to offload flight support activities to other research Centers, freeing up personnel at the flight Centers to work development.

As part of the FY 2008 budget formulation process, NASA Space Shuttle project and element leadership will build detailed project-level human capital plans in partnership with their prime and sub-contractors and the human capital community. The projects’ leadership will provide a transition assessment and develop appropriate retention and transition strategies for the civil service and contractor workforce. Measurement and analysis tools will be defined to determine how effectively the transition objectives are being met. Concurrently with the FY 2008 budget formulation process,

the Space Shuttle program is developing mechanisms to ensure that measurable expectations are set; to establish accountability for gathering, analyzing, and reporting the transition metrics; and to utilize these metrics to mitigate risk.

Communication and collaboration efforts and activities with key stakeholders will continue both inside and outside of the Space Shuttle program. These key stakeholders include the Space Shuttle workforce, NASA Headquarters and Centers, the International Space Station (ISS) and exploration systems programs, the contractor community, NASA unions, other Federal agencies, Congress, Federal, state, and local government officials, and the public.

# **HUMAN CAPITAL PLAN FOR MISSION EXECUTION, TRANSITION, AND RETIREMENT OF THE SPACE SHUTTLE PROGRAM**

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## SECTION 1—INTRODUCTION

The *Human Capital Plan for Mission Execution, Transition, and Retirement of the Space Shuttle program* (herein known as the “*Shuttle Human Capital Plan*”) is submitted to Congress in response to the requirement stated in Section 502(c) of the Conference Report accompanying the NASA Authorization Act of 2005.

NASA’s number one priority is safe and successful mission execution through Space Shuttle fly-out and retirement no later than 2010. The Space Shuttle program has identified retaining critical skills as a top program risk for safe and successful mission execution. As a result, the *Shuttle Human Capital Plan* focuses specifically on the strategy that NASA will implement to ensure retention of critical workforce skills needed for safe and successful mission execution and the smooth transition of Shuttle workforce skills – as appropriate – to the ISS, exploration systems, and other future programs.

NASA recognizes that the workforce issues surrounding Space Shuttle mission execution and transition are particularly challenging. The Agency must retain the critical skills needed for the continued safe execution of the Space Shuttle program through program completion. At the same time, the Agency must plan for the smooth transition of much of the same workforce to other exploration programs during the short timeframe between Space Shuttle program retirement and the beginning of future system operations. The importance and magnitude of this challenge require that NASA take an integrated approach to workforce management that leverages capabilities and lessons learned both within the Space Shuttle program and throughout the Federal Government.

### 1A. BACKGROUND

On January 14, 2004, President George W. Bush announced *A Renewed Spirit of Discovery: The President’s Vision for U.S. Space Exploration*, a new directive for the Nation’s space program. The fundamental goal of this directive is “to advance U.S. scientific, security, and economic interests through a robust space exploration program.” With this action, the President committed the Nation to a journey of exploring the solar system and beyond, returning to the Moon in the next decade, then venturing further into the solar system, ultimately sending humans to Mars and beyond. He challenged NASA to establish new and innovative programs to enhance understanding of the planets, to ask new questions, and to answer questions that are as old as humankind. Congress endorsed this Vision for Space Exploration when both the U.S. Senate and the U.S. House of Representatives overwhelmingly adopted the NASA Authorization Act of 2005 which was signed into law on December 30, 2005.

To implement the *Vision for Space Exploration*, NASA will retire the Shuttle no later than 2010. Over the next four and a half years, NASA will be executing a series of complex ISS assembly and servicing missions using the Space Shuttle while simultaneously developing a new Shuttle-derived transportation system. Implementing a workforce transition plan that retains and nurtures critical skills is vital to these efforts.

The Space Shuttle program is responsible for the engineering, design, development, test, and operations of major Space Shuttle systems, including the orbiter, Space Shuttle Main Engine, Solid Rocket Booster, Reusable Solid Rocket Motor, and External Tank projects. These five project offices are located at the Marshall Space Flight Center in Huntsville, Alabama, and the Johnson Space Center in Houston, Texas. In addition, ground support systems work is located at the Kennedy Space Center in Florida, the White Sands Test Facility in New Mexico, the Stennis Space Center in Mississippi, and the Johnson Space Center. The program’s multidisciplinary workforce of approximately 2,000 civil servants and 15,000 contractors is located at these and other Government and contractor facilities located throughout the United States.

## 1B. GOALS

NASA's first strategic goal is to fly the Shuttle as safely as possible until its retirement no later than 2010. The fundamental program objectives that support this goal are to maintain the safety and integrity of the existing Space Shuttle system and processes, while planning for Space Shuttle retirement and transitioning to new exploration systems that do not require the same industrial base needed today to operate the Space Shuttle.

These program objectives have profound implications in the area of human capital. NASA recognizes that the critical skills embedded in the Space Shuttle workforce are the program's greatest asset. In order for the program to safely and successfully complete its mission objectives, the critical skills that reside in both the civil service and contractor workforce must be maintained through Space Shuttle retirement. At the same time, this workforce possesses much of the talent that will be needed to meet the challenges presented by the *Vision for Space Exploration*. This talent and expertise must be made available to support exploration objectives as soon as they are needed. A key component of meeting these objectives is to provide a human capital plan that seamlessly capitalizes on the existing knowledge and skills within the workforce to safely fly-out the Space Shuttle while beginning to make staff available to the ISS and the development efforts taking place within the Constellation Systems program. The *Shuttle Human Capital Plan* will roll up into the larger *Human Space Flight Transition Plan* that will be released in the summer of 2006.

## 1C. PRINCIPLES AND PURPOSE

As NASA and the Space Shuttle program design, develop, and implement a Human Capital Plan to safely and successfully fly-out and retire the Space Shuttle, the program has established key principles that will serve as a framework as we move forward:

- The program will conduct an orderly phase out of the Space Shuttle and a smooth transition of Space Shuttle workforce where possible.
- NASA is committed to capitalizing on the potential of the Space Shuttle workforce by using existing skills – enhancing and transitioning them to the ISS, exploration systems, and other programs where possible.
- This effort is managed at the project/element level due to the uniqueness of the contracts and follow-on environments of the five major projects within the Space Shuttle program, with a high degree of coordination and integration with Mission Directorate and Agency-level workforce planning and assessment activities.

Therefore, the purpose of the Shuttle Human Capital plan is to:

- Ensure safe and successful mission execution as the top Space Shuttle program priority.
- Maintain a capable and committed civil service and contractor workforce for mission execution by ensuring that critical skills are available when needed.
- Manage the workforce transition process in a way that balances skills for the Agency and the Space Shuttle program.

## 1D. ROLES AND RESPONSIBILITIES

The NASA Administrator has testified before Congress that the transition from the Space Shuttle is NASA's greatest management challenge over the next several years. Because the transition spans

multiple Mission Directorates, accountability for an effective transition rests with top Agency management, supported by program and project managers in each Mission Directorate, and line managers at the NASA Field Centers. Transition issues are complex, and therefore transition planning will be an iterative, evolutionary process requiring tight integration between current operators and the teams involved in developing new exploration systems. Some of the key roles and responsibilities relevant to the Space Shuttle program workforce transition include:

### **Project/Element Managers**

- Responsible for managing human resources within their project to ensure mission success.
- Identify critical skills needed to safely fly-out the Space Shuttle.
- Plan for future workforce needs and potential workforce transition costs related to significant project changes.

### **Program Manager**

- Responsible for managing human resources within the program to ensure mission success.
- Plan for future workforce needs and potential workforce transition costs related to significant program changes.

### **Mission Directorates**

- Responsible for workforce planning required to support programs and projects.
- Facilitate smooth, effective transition of workforce through assignment or redistribution of programs/projects/work to Centers as appropriate to sustain ten healthy Centers.
- Provide information on program content to enable Centers to determine how to plan for future workforce needs.

### **Center Management and Center Human Capital Officers**

- Responsible for designing and implementing human capital strategies that ensure mission success.
- Human Capital Officers/Human Resource Directors will serve as an advisory group and help integrate human capital strategies for the Space Shuttle program.
- Engage Mission Directorates and Agency offices when Center efforts are insufficient to resolve civil service workforce transition issues at the Center level.

### **Agency Office of Human Capital Management**

- Responsible for integrated workforce transition planning and management efforts across the Agency.
- Provide Agency-level leadership, expertise, and policy direction in workforce transition issues.
- Apply Agency resources or influence to resolve workforce issues that cannot be solved by Centers or programs alone.

## SECTION 2: HUMAN CAPITAL TOOLS

### *Civil Service Workforce*

NASA will use all available workforce management tools to retain the Space Shuttle civil service workforce through Space Shuttle fly-out and during the workforce transition process. Several of these tools were provided to the Agency through the NASA Flexibility Act of 2004.

TRANSITION TOOLS—NASA is committed to transitioning as much of the Space Shuttle civil service workforce to other Agency programs, including the ISS and Constellation Systems programs, as is practicable to meet the needs of those programs. To facilitate this workforce transition—particularly during the early stages—the programs will, as appropriate, use workforce sharing, matrix, and detail arrangements as well as retraining opportunities. For employees who are not assigned to the ISS or Constellation Systems programs, NASA will make every effort to place them elsewhere with the Agency where their skills can be used or assist them in transitioning outside of the Agency. Our goal is to maintain ten healthy Centers, and one way to do this is to focus more on systems management and engineering in-house. At the same time, the decision to use Shuttle-derived propulsion elements as the foundation for the next generation of exploration systems means that NASA can leverage many of the skills in the current Space Shuttle workforce during the development of exploration systems such as the Crew Launch Vehicle. NASA has several processes in place within the program and at the Agency level to facilitate the identification of these opportunities and placement of personnel.

NASA also has a contract in place to provide comprehensive career transition assistance and placement services to employees displaced by workforce actions. The assistance offered goes beyond the minimum requirements of Federal regulations to provide a broad range of services, including:

- Job search support in the public and private sector, tailored to a particular labor market.
- Outreach efforts with local jurisdictions, employers, interest groups, and Federal, state and local governments.
- Assistance in resume preparation, preparing for employment interviews, negotiating salary and benefits, and preparing a self-marketing plan.
- Organizing job fairs.
- Conducting workshops on financial planning, unemployment compensation, social security benefits, transition to teaching, networking.
- Providing Federal specific information on reemployment, retirement, severance pay, benefits, unemployment compensation, and Federal priority consideration programs.

RETENTION TOOLS—Not all retention tools require the traditional financial incentives. One of NASA's most important retention tools is its mission—the exciting, challenging work of preparing and launching the Space Shuttle and the unique development challenges of achieving the *Vision for Space Exploration*. The proposed architecture for the Constellation Systems program draws heavily on Space Shuttle heritage, facilitating a smoother transition of the workforce to follow-on programs that support the *Vision for Space Exploration*. When necessary to retain critical skills in specific cases, NASA will use targeted tools such as retention incentives, qualifications pay, and temporary promotions to ensure it has the workforce necessary for safety and mission success.

ALTERNATIVE STAFFING TOOLS—Even with effective retention strategies, NASA recognizes that the loss of valued skills will remain a risk to the Space Shuttle program. NASA is prepared to address this risk through the use of other alternative staffing tools that are



available for recruiting additional staff, when needed. These tools include the new flexible term appointment authority provided by the NASA Flexibility Act of 2004, emergency appointments, hiring retired employees, using experts and consultants, and other special hiring authorities. These flexible hiring authorities, combined with attractive compensation packages, will enable the Agency to address critical skills attrition as circumstances evolve.

These tools—individually or in combination—will be the primary mechanisms for mitigating defined human capital risk to the Space Shuttle program and for ensuring a smooth transfer of human capital to new programs whenever possible.

### ***Contractor Workforce***

NASA and the Space Shuttle program are committed to working with our contractor partners on their human capital challenges. However, due to defined Government and contractor roles and responsibilities and the relevant Federal acquisition rules and regulations, the Government's role in defining transition opportunities for the contractor workforce is more circumscribed than it is for civil servants.

The contractor community has a range of transition, retention and alternative staffing tools available to meet their contractual obligation of maintaining critical skills required for safe fly-out. These tools will vary with the individual contractor and the unique parameters of their specific Space Shuttle support contract. In addition, as the Constellation Systems program architecture matures (with associated technical requirements and schedule), the Agency and its contract partners will be in a better position to assess the specific human capital challenges faced by each contractor. Since each Space Shuttle project and element will be affected by Constellation Systems program decisions, the contractor workforce requirements and their strategies will vary for retention and transition.

Based on the Constellation Systems program decisions and Space Shuttle program timelines and schedules, the Space Shuttle program and its contractor partners will collaborate on retention and transition issues through the development of project-level human capital plans, as part of the FY 2008 budget formulation process (detailed in Section 3). Many of the Space Shuttle contractor partners have already begun to develop these human capital plans.

## SECTION 3: OUR APPROACH—COMMUNICATION AND COLLABORATION

No discussion of human capital tools would be complete without mentioning the fundamental role played by effective communication and collaboration between the key Space Shuttle program stakeholders, especially the workforce. Keeping personnel up to date on the status of their work, their benefits and entitlements, and their follow-on employment opportunities is an essential element of successful mission execution, fly-out, and transition. A coordinated effort between all levels of NASA management and the contractor community is necessary to provide timely, frank, and complete information to the civil service and contractor employees, suppliers, and vendors. Active communication will be a key tool used to limit program risk throughout the remaining years of the Space Shuttle program.

In addition, NASA is committed to open and frequent sharing of information with its unions – beyond the minimal statutory requirements. The Agency will give careful consideration to comments and suggestions from the unions through the critical planning stages as well as the implementation phase.

The Space Shuttle program has established an intra-agency Human Capital Team with representatives from NASA Headquarters, the Kennedy Space Center, the Marshall Space Flight Center, the Stennis Space Center, and the Johnson Space Center. This group meets regularly to exchange relevant human capital information, serves as an advisory group to the Space Shuttle program leadership on critical human capital issues, and assists with the development and implementation of the project-level human capital plans.

The Human Capital Team has engaged the contractor community by presenting an overview of human capital planning and by facilitating a panel discussion of contractors on their concerns and strategies for human capital. The Human Capital Team collaborated with the Space Shuttle Business Management Office to develop budget guidelines for the human capital area. Through the FY 2008 budget formulation process, the projects will provide detailed workforce data including:

- Civil service and contractor staffing numbers.
- Last need dates for capabilities and skills.
- Which positions are critical to retain through the end of the program or other milestones.

Based on the budget data, the projects will build project-level Human Capital Plans. In partnership with their prime and subcontractors and the human capital community, the projects will:

- Describe the current situation of the project (including the extent to which the project resources will be transitioned to other programs).
- Build a workforce profile (based on the FY 2007 budget data) that will show the workforce requirements against expected attrition, both civil service and contractor.
- Identify which positions are critical to safe program fly-out.
- Develop project-appropriate retention and transition strategies for the civil service and contractor workforce—focusing on the critical positions.
- Identify risk mitigation strategies for unexpected critical skills losses.

In addition to these current, ongoing efforts, the Space Shuttle program has initiated other activities to communicate information effectively to the workforce. Some notable examples are:

- The Space Shuttle Program Transition Manager has briefed NASA Center Human Capital Officers/Human Resources Directors on Space Shuttle program transition activities.
- The lead for Space Shuttle Human Capital briefed the senior Space Shuttle program leadership team (civil service only) on human capital activities and initiatives in support of leadership meetings with the Space Shuttle workforce.

- The Space Shuttle Program Manager has hosted “All Hands” meetings for civil service and contractor employees at the Marshall Space Flight Center, the Johnson Space Center, and the Kennedy Space Center. Furthermore, the Space Shuttle Program Manager has hosted “All Hands” meetings at a number of the contractor plants and facilities—talking directly to contractor employees in the field. These meetings are an important tool to provide clear and consistent messages to the workforce. As importantly, these “All Hands” provide an opportunity for employees to ask questions and provide feedback on workforce issues to the Space Shuttle leadership and human capital teams

The Space Shuttle program will continue to use a variety of approaches to communicate with the Space Shuttle workforce, including civil service employees, employee representatives, and contractors. These tools will include additional “All Hands” meetings, project level briefings, plant/facility visits, newsletters, a transition Web portal, and other relevant methods. Key messages will focus on follow-on work for the Space Shuttle community, retention and transition activities, and status of the Space Shuttle program. The Space Shuttle program is also developing methods and tools to track and assess employee morale, which may include assessments and recommendations from outside experts, surveys, focus groups, and attrition rates. Space Shuttle leadership is directly involved in these activities and will be continuously advised by the Human Capital Team on transition, retention, and change management strategies and tools.

The Space Shuttle program will also continue its ongoing benchmarking activities, reviewing the lessons learned from the closeout of other major programs and incorporate those lessons as appropriate into Space Shuttle program and Agency human capital plans. In addition, NASA is focusing on retaining the knowledge possessed by those whom the Agency does not retain “in person.” NASA’s knowledge management efforts address this issue by helping to ensure that the knowledge and “corporate memory” are retained even after an individual leaves NASA. The Agency supports the many knowledge transfer activities that occur daily throughout every organization and at each Center.

## APPENDIX A: TRANSITION ACTIVITIES TO DATE

Human space flight transition activities began with the release of the *Vision for Space Exploration* in January 2004. At the Integrated Space Operations Summit in April 2005, the Space Shuttle program discussed preliminary results of hardware, infrastructure, and workforce inventories needed to support a fly-out through 2010. The ISS program also presented an initial estimate of the impact and challenges of Shuttle retirement on Station logistics support and utilization after 2010. During this time, NASA also undertook a number of benchmarking studies of previous large-scale, high technology system transitions including the Titan IV rocket fly-out, the F/A-18 fighter closeout, and the Base Realignment and Closure activities. The National Academy of Public Administration assisted in this effort, particularly in the development of lessons learned that might be applicable in the current situation.

The next major milestone in human space flight transition came with the release of the Exploration Systems Architecture Study (ESAS) in September 2005. ESAS called for the development of new Crew and Heavy-Lift Launch Vehicles to support exploration missions to the ISS, the Moon, and Mars. The development of these vehicles is managed by the Constellation Systems program office based at the Johnson Space Center. To minimize any potential gaps in our human space flight capability and return the best value to the Nation, these new vehicles will evolve from Space Shuttle propulsion elements and will leverage existing Space Shuttle workforce, facilities, and technology to the greatest extent possible consistent with overall Agency objectives.

Over the past year, the Space Operations and Exploration Systems Mission Directorates have encouraged close working relationships among personnel in the Space Shuttle, ISS, and Constellation Systems programs. Colocation of both operations and development program management at the Johnson Space Center facilitates these relationships and ensures that all three programs effectively exchange knowledge and identify and appropriately disposition assets for transition.

The Space Shuttle program has also hosted two technical interchange meetings on transition to survey existing Agency capabilities in areas like human capital management, data archiving, environmental remediation, and historical preservation. A standing Transition Control Board provides Headquarters-level insight and guidance into important tactical-level transition issues, while a Joint Integration Control Board provides direction for strategic integration functions that cut across multiple operations and development programs.

In compliance with the Federal Acquisition Regulations, NASA has developed a strategy that enables the Agency to use existing contracts to begin early development work in key areas when applicable. The Space Shuttle program named a Lead for Human Capital and established a Human Capital Working Group consisting of members from the four Centers and NASA Headquarters responsible for Shuttle work, and has engaged the Agency human capital community to address critical workforce issues facing the program. The Working Group not only serves as an advisory group to the Space Shuttle program, but will also assist in the development and implementation of the project-level Human Capital Plans that are being developed as part of the FY 2008 budget formulation process.

The Space Shuttle program recognizes that frequently updating the workforce on Shuttle mission execution and transition is a key retention tool. Starting in FY 2006, the Space Shuttle Program Manager has hosted "All Hands" meetings with civil service and contractor employees at Marshall Space Flight, Kennedy Space, and Johnson Space Centers. The Space Shuttle Program Manager has also hosted "All Hands" meetings at contractor facilities. Further, the program is working on other communication tools such as articles and a soon to be released Web portal.