National Aeronautics and Space Administration

NASA Transition Strategy

Version #2.1

February 2008

Approved By:

Jonathan Pettus
Chief Information Officer
NASA Office of the CIO

02-20-08 (BJM)
~~10-20-08~~
Date

Approved By:

Michael Hecker
CIO of Operations and Architecture
NASA Office of the CIO

20 Feb 08
Date

Prepared By:

Willard Peters
Chief Enterprise Architect
NASA Office of the CIO

2-20-08
Date

NASA Transition Strategy
Change History

Date of Change	Sections(s) Affected	Brief Description of Change	Change Made By	Organization
August 31, 2006	New Document	Initial baseline Document	NASA Chief Enterprise Architect	NASA Office of the CIO
October 27, 2006	All sections	Version Update to v1.1 to reflect OMB 300 changes	NASA Chief Enterprise Architect	NASA Office of the CIO
October 30, 2006	Investment NISN	Version Update to v1.2 removes NISN SBU information	NASA Chief Enterprise Architect	NASA Office of the CIO
October 31, 2006	Investment HSPD-12	Version Update to v1.3 to insert new guidance for HSPD-12	NASA Chief Enterprise Architect	NASA Office of the CIO
November 21, 2006	OAIT sequencing plan	Version Update to v1.4 to insert new OCIO roadmap to reflect strategic changes	NASA Chief Enterprise Architect	NASA Office of the CIO
February 26, 2007	All Sections	Version Update to v1.5 to reflect OMB 300 changes	NASA Chief Enterprise Architect	NASA Office of the CIO
September 30, 2007	All Sections	Version Update to 2.0 to reflect OMB 300 updates	NASA Chief Enterprise Architect	NASA Office of the CIO
February 18, 2008	All Sections	Major changes and updates throughout the document	NASA Chief Enterprise Architect	NASA Chief Enterprise Architect

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

Executive Summary

Throughout the Federal Government, transformation is being driven by the President's Management Agenda (PMA), legislative changes, judicial judgments, social and economic trends, and security concerns. These drivers serve as key influencers that frequently lead to business transformation. At NASA, Enterprise Architecture (EA) is used as a principal mechanism to transform business processes, mission-enabling investments, and life cycle management towards an optimized state. EA is increasingly being leveraged as a structured method of analysis for improving mission performance.

The NASA EA program has leveraged this structured planning approach to new levels of effectiveness. Through governance, policy, and methods, the EA program has lead the use of an architectural approach that is improving processes and information sharing, reducing redundant services and investments, and is a key enabler in guiding business transformation within NASA. Through these transformation activities, the EA program has been increasingly recognized as a leader in producing results or "Actionable Architecture" that improve performance.

The EA could be NASA's largest single contributor to business transformation, with other transformation initiatives helping to shape the future state. When all of the transformation initiatives are viewed together at the enterprise level, it is apparent that fundamental change is spreading through NASA's business and technology communities. And NASA's transition strategy is used as a major component for effecting change. It describes the overall plan for the Agency to achieve its target architecture within a specified timeframe, and it clearly links proposed agency investments to the target architecture. The transition strategy also helps define logical dependencies between transition activities among programs and projects against their relative investment priorities. Essentially, it is the multi-year plan to coordinate agency initiatives toward achieving the target architecture.

The scope of the NASA transition strategy includes the entire agency. It reflects segment architectures associated with NASA's Lines of Business (LoBs) and mission support cross-cutting segments within the agency. It is presented at a summary level of detail, while the segment architecture transition strategies include considerably more detail and are included as subsets of the transition strategy.

This document summarizes NASA's LoB's and infrastructure transformation projects that are planned or underway, and aimed at improving NASA's mission performance. High-level sequencing plans of transformational projects and initiatives are provided for each major investment within each LoB.

This is a companion report to the NASA Enterprise Architecture Program Executive Overview. That document presents a summary of NASA's EA Program, expressing "where we were", "where we are today", and "where we are going."

Purpose

NASA's Transition Strategy describes the agency's plan for migrating from its baseline architecture to its target architecture. The Transition Strategy is a major component of an effective EA practice. It describes the overall plan for NASA to achieve its target EA within a specified timeframe, and it clearly links proposed agency investments to the target architecture. Also, the Transition Strategy helps to define logical dependencies between transition activities (programs and projects) and helps to define the relative priority of these activities (for investment purposes). [1] Initiatives addressed in the Transition Strategy include those associated with major and tactical investments specified in the FY2010 IT investment portfolio. The Transition Strategy is a working document. It is continuously reviewed and updated to reflect changing enterprise-level and segment-level business drivers, priorities, and resources. An approved version of the Transition Strategy is developed and approved each year to support the agency IT Investment Management (ITIM) process and budget formulation.

Document Structure

This Transition Strategy is organized using the following structure:

Introduction: Provides a general **description** of the purpose, scope, and methodology for the Transition Strategy.

NASA Mission / Change Drivers: Presents the long range goals and major milestones for the agency.

Baseline Architecture: Presents an overview of the baseline architecture.

Enterprise Sequencing Plan: Presents a high-level, agency-wide view of modernization activities, outlining the relative prioritization and sequencing of enterprise segments, programs and projects, and relationships between activities.

Performance Improvement Summary: Provides a summary description of the performance goals and planned results from each segment, program or project identified in the sequencing plan.

Target Architecture: Presents an overview and illustration of target architecture.

Cross-Agency Initiative Integration Summary: Provides a consolidated view of planned activities and milestones to implement mandatory and informational cross-agency initiatives described in the Federal Transition Framework (FTF) Catalog.

[1] Federal Enterprise Architecture Program EA Assessment Framework 2.2 October 2007

Segment Architecture Overview: Provides a summary description of active enterprise segments defined in the EA Transition Strategy.

Mission Directorate Goals: Defines the high-level strategic goals and milestones for the mission directorates (Lines of Business) which make up the Core Mission Segments.

Major Investments: Defines the investments and tactical goals within each mission directorate to enable achievement of their respective goals.

Introduction

The NASA Office of the Chief Information Officer (OCIO) manages NASA's Enterprise Architecture (EA) Program, under the leadership of the NASA Chief Enterprise Architect (CEA). The OCIO oversees many of the Agency's core strategic planning and accountability functions, including information security, capital planning and investment control, information resources strategic planning, and of course, enterprise architecture. The NASA EA Program fulfills multiple Federal mandates related to planning and managing investments and supporting organizational effectiveness at the agency level, Segment levels, and with relevant e-Gov initiatives.

One major element of NASA's EA is its Transition Strategy, a guide for tracking transformational change. The Transition Strategy describes the overall plan for the Agency to achieve its target architecture within a specified timeframe, and it clearly links proposed agency investments to the target architecture. The transition strategy also helps define logical dependencies between transition activities among programs and projects against their relative investment priorities. Essentially, it is the multi-year plan to coordinate agency initiatives toward achieving the target architecture.

The scope of the NASA transition strategy includes the entire agency. It reflects segment architectures associated with NASA's Lines of Business (LoBs) and mission support cross-cutting segments within the agency. It is presented at a summary level of detail, while the segment architecture transition strategies include considerably more detail and are included as subsets of the transition strategy.

Core Values Driving Investment Transition

NASA's strategy for the future represents a new paradigm in which strategic building blocks progressively create steppingstones to exploration and discovery. To be successful, NASA must transform itself while being guided by a set of core values. These values are not only central to responsible public service, they are also essential to the achievement of the Vision and Mission. With these values as the solid foundation, NASA will pursue these five significant transformations:[2]

- All investments will contribute to a single set of Agency goals and will be directly traceable to our Vision and Mission;
- Human space flight capabilities will be expanded to enable research and discovery;
- Technology developments will be crosscutting;
- Education and inspiration will be an integral part of all NASA programs; and
- We will operate as One NASA in pursuit of our Vision and Mission.

[2] NASA Strategic Plan 2003, page 10.

Major Transition Elements

NASA's transformation will help enable achievement of the National Vision for Space Exploration. NASA's four LoBs execute the mission of NASA and are the business areas accountable for Agency goal achievement.

Exploration Systems Mission Directorate (ESMD): Responsible for creating a suite of new capabilities, called Constellation Systems, to enable human exploration. Constellation Systems include a crew exploration vehicle, transportation systems, lunar and planetary body exploration systems, in-space support systems, and ground-based support systems. The ESMD portfolio also includes robotic missions to the Moon and research payloads that use the International Space Station, as well as ground-based experimental facilities.[3]

Science Mission Directorate (SMD): Carries out the scientific exploration of Earth and space to expand the frontiers of Earth science, heliophysics, planetary science, and astrophysics. Through a variety of robotic observatory and explorer craft and through sponsored research, the Directorate provides virtual human access to the farthest reaches of space and time, as well as practical information about changes on our home planet.[4]

Space Operations Mission Directorate (SOMD): Responsible for NASA space operations related to exploration in and beyond low-Earth orbit with special emphasis on human activities in space. SOMD is responsible for Agency leadership and management of NASA space operations related to launch services, space transportation, space communications and navigation, and rocket propulsion test in support of human and robotic exploration requirements.[5]

Aeronautics Research Mission Directorate (ARMD): Conducts research and technology activities to develop the knowledge, tools, and technologies to support the development of future air and space vehicles and to support the transformation of the Nation's air transportation system. ARMD's programs focus on cutting-edge, fundamental research in traditional aeronautical disciplines, as well as emerging fields with promising applications to aeronautics.[6]

Mission Support: Operational elements that provide cross-cutting support NASA's four LoB's include Safety and Mission Assurance, Program Analysis and Evaluation, Chief Financial Officer, Chief Information Officer, Chief Engineer, Institutions and Management, General Counsel, Strategic Communications, External Relations, Inspector General, Health and Medical, Integrated Enterprise Management, Innovative Partnerships, and Institutional Integration

---

[3] NPD 1000.3C, Section 4.2.1 Exploration Systems Mission Directorate (ESMD)
[4] NPD 1000.3C, Section 4.4.1 Science Mission Directorate (SMD)
[5] NPD 1000.3C, Section 4.3.1 Space Operations Mission Directorate (SOMD)
[6] NPD 1000.3C, Section 4.5.1 Aeronautics Research Mission Directorate (ARMD)

Transforming NASA requires taking the extraordinary capabilities available throughout the Agency and restructuring them to achieve the goals of the 21st century. NASA has already streamlined its Headquarters organization structure and begun transforming the culture to foster permanent change and effect a positive, mission-driven culture throughout the organization. As evidence, this Transition Strategy documents NASA's major investments across its LoBs and mission support offices. This report describes these investments, and then illustrates the major sequencing events that will transform those investments to deliver tomorrow's required results.

Transition Planning Approach

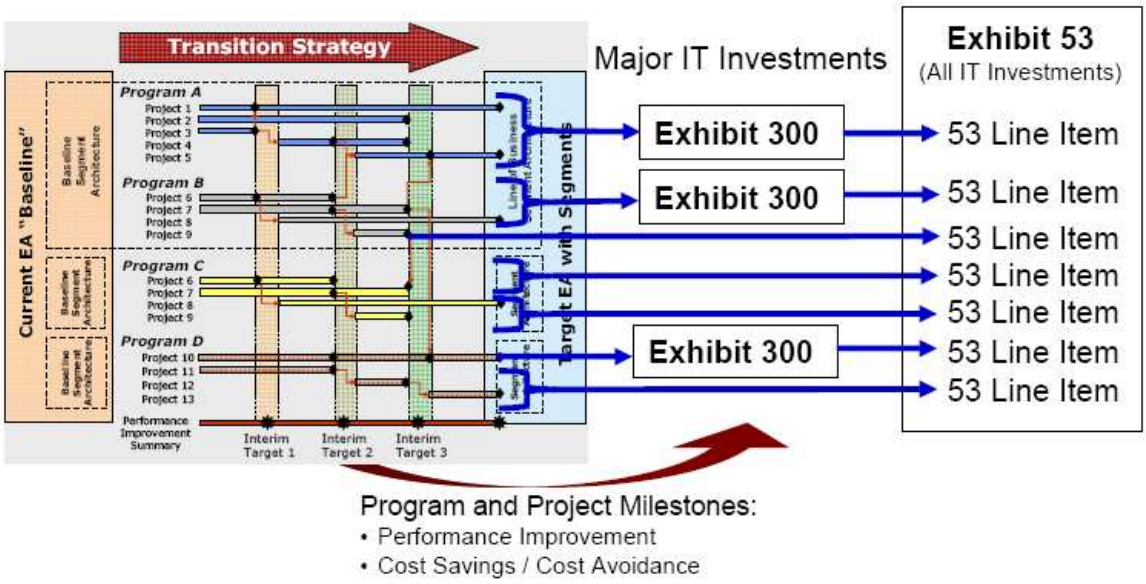
Enterprise Architecture is a strategic resource that helps NASA plan, invest in, and implement information technology solutions to meet business needs and help manage the IT investment portfolio. Development of the EA transition strategy occurs during the "Architect" phase of the Performance Improvement Lifecycle depicted in Figure 1. The transition strategy is a key product of the "Architect" phase leading to a proposed investment portfolio in the "Invest" phase.

Figure 1: EA Transition Strategy in the Performance Improvement Lifecycle[7]

A primary output from the agency EA transition strategy is an investment approach whereby the entire investment portfolio can be traced back to a business-approved architectural portfolio. The EA transition strategy should include clear linkage between initiatives identified in the transition strategy and specific investments in the agency's investment portfolio as illustrated in Figure 2.

[7] FEA Practice Guidance November 2007

Figure 2: Linking EA Transition Strategy to the Investment Portfolio[8]



As the figure illustrates, architecture influence investment strategy, which in turn drives transition strategy. The outcome is mission-enabling investments which deliver upon target performance outcomes.

[8] FEA Practice Guidance November 2007

NASA Mission / Change Drivers

NASA's Mission Directorates and Centers will collaborate on an affordable, evolvable strategy to accomplish NASA's Strategic Goals:

- SMD, through its robotic missions and space observatories, will continue to collect key data and provide stunning images of distant galaxies and planets in the solar system, including Earth.

- SOMD will operate the Space Shuttle until its retirement and will manage completion and use of the International Space Station to ensure its continued availability as a unique space outpost and laboratory.

- ESMD will develop future transportation systems and technologies to return humans to the Moon and to maintain a human presence in space. This Directorate, through its commercial and prize programs, also will stimulate new ideas and invite entrepreneurs to provide space capabilities from the private sector.

- ARMD will re-establish NASA's dedication to the mastery of core competencies in subsonic, supersonic, and hypersonic flight. This Directorate will develop system-level, multi-disciplinary capabilities to meet the needs of both civilian and military communities.

NASA has six primary strategic goals to accomplish its vision and mission:

Strategic Goal 1:

Fly the Shuttle as safely as possible until its retirement, not later than 2010.

The Space Shuttle is the Nation's only human-rated launch vehicle. It also is the only vehicle in the world with the launch, return, and on-orbit capabilities needed to complete the planned assembly of the ISS.

The Vision for Space Exploration focuses the Shuttle program on completing assembly of the ISS, using as few Shuttle flights as possible, and retiring the Shuttle by 2010. NASA expects elements of the Shuttle's systems, including the external tank, solid rocket boosters, and main engines, to serve as the basis for future exploration systems that will carry crew and cargo to the ISS, the Moon, Mars, and beyond.

Managing the retirement of the Shuttle is particularly challenging since NASA will conduct a series of complex ISS assembly and Hubble servicing missions using the Shuttle while simultaneously exploring and developing future transportation alternatives, including a new Shuttle-derived replacement transportation system. Simultaneous operations and development activities will require that NASA find new ways to use existing Shuttle workforce, hardware, and infrastructure assets efficiently and

effectively. In conjunction with these activities, NASA will identify Shuttle capabilities required for new exploration systems and preserve them for potential future use.

Strategic Goal 2:

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

Completing assembly of the ISS is a vital part of NASA's program of exploration. The ISS demonstrates the utility of working with an international partnership on a permanently crewed platform in space and enables the Agency to develop, test, and validate the next generation of technologies and operational processes needed to continue exploring.

NASA will complete assembly of the ISS and meet the Agency's commitments to the International Partners. Once the Space Shuttle returns to flight, NASA will launch the remaining U.S. and International Partner elements. Before its retirement in 2010, the Agency also will use the Space Shuttle to carry spare equipment and other items to the ISS that are needed for maintenance and continued operations.

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.

The Vision for Space Exploration includes robotic exploration of planetary bodies in the solar system, advanced telescope searches for Earth-like planets around other stars, and the study of the origins, structure, evolution, and destiny of the universe. Other initiatives guide NASA's study of Earth from space and build on NASA's rich heritage of aeronautics and space science research.

In their endeavors to explore, researchers in aeronautics and astronautics, biomedical and physical sciences, Earth science, and space science will continue to develop new technologies and capabilities with the potential to benefit billions of people on Earth. In addition, the Vision for Space Exploration provides unprecedented opportunities for the United States to continue to lead peaceful and productive international partnerships in the world community.

NASA also is the lead government agency for civil aeronautics research, and aeronautics remains a core part of the Agency's Mission. NASA's aeronautics research initiatives will expand the capacity and efficiency of the Nation's air transportation system and contribute to the safety, environmental compatibility, and performance of existing and future air and space vehicles. NASA will work with the White House Office of Science and Technology Policy to develop a national policy that articulates federal agency roles and responsibilities and guides the aeronautics research and development programs of the United States through 2020.

Strategic Goal 4:

Bring a new Crew Exploration Vehicle into service as soon as possible after Shuttle retirement.

The current Space Transportation Systems-the Space Shuttle and existing expendable launch vehicles-are unsuitable for exploration beyond low Earth orbit. Therefore, the President and Congress directed NASA to develop new space transportation capabilities that will provide the Nation with the means to return humans to the Moon and eventually carry them to Mars. The initial capabilities, the Constellation Systems, include the Crew Exploration Vehicle (CEV), Crew Launch Vehicle (CLV), spacesuits and tools required by the flight crews, and associated ground and mission operations infrastructure to support low Earth orbit missions.

NASA is targeting CEV and CLV operational availability for no later than 2014, however, the Agency will strive to bring that date as close to 2010 as possible as NASA achieves efficiencies and synergies between the Constellation Systems and the Space Shuttle programs.

NASA envisions that the CEV and CLV will be evolutionary vehicles that use the best aspects of the Apollo and Space Shuttle systems (e.g., using the shape of the Apollo capsule as the basis for the shape of the CEV and using the proven Shuttle propulsion elements for the first stage of the CLV). NASA will develop the CEV and CLV using the Agency's rich resources of in-house and contractor expertise, leveraging the existing Space Shuttle workforce and infrastructure as much as possible.

There are two launch vehicle projects: the CLV and the Heavy Lift Launch Vehicle (HLLV), each serving unique functions. The CLV will launch the CEV into orbit, and it will have cargo launch capabilities. The CLV will be operational no later than 2014. The HLLV, as currently envisioned, will launch cargo only and will provide the lift capability needed for transportation to the Moon no later than 2020, but as early as 2018.

Strategic Goal 5:

Encourage the pursuit of appropriate partnerships with the emerging commercial space sector.

Since the first commercial communications satellites were launched in the mid-1960s, the commercial space sector has grown into a multi-billion dollar industry that launches multiple commercial missions annually, including launches of NASA satellites and space probes on commercial launch vehicles. With the recent success of the Ansari X-Prize and other ongoing private space efforts, the potential for the commercial space sector to engage new markets, especially those involving human spaceflight, is stronger than ever.

NASA will pursue collaborations that help expand the commercial space sector and support NASA's mission. By working with established commercial launch service providers and encouraging development of the emerging entrepreneurial launch sector

through incentives like awarding prizes and intellectual property rights for their achievements in space technologies and systems, the Agency hopes to accelerate the growth of the commercial space industry.

NASA also is encouraging the emergence of a U.S. commercial space sector through more creative, less traditional approaches. Historically, prize competitions like the Ansari X-Prize, the DARPA Grand Challenge, early aviation prizes, and the Longitude Prize, have stimulated innovative feats in private sector flight, engineering, science, and exploration. NASA has initiated a series of small prizes for ground-based demonstrations of breakthroughs in various aerospace technologies. However, the most rewarding prize competitions are for full flight systems that involve multiple technologies.

Therefore, by 2012, NASA plans to offer one or more prize competitions for independently designed, developed, launched, and operated missions related to space science or space exploration, like a soft lunar robotic lander, a propellant storage and transfer mission, a station-keeping solar sail, various suborbital launch achievements, and/or a human orbital flight.

Strategic Goal 6:

Establish a lunar return program having the maximum possible utility for later missions to Mars and other destinations.

Transporting humans from Earth to the Moon and back in a sustainable, safe, and affordable manner will recapture the spirit of the Apollo program and ignite the Nation's excitement about space exploration as the United States takes the first major steps in preparing for future missions to Mars and beyond. However, missions to the Moon will be vastly different in this century. More crewmembers will land on the lunar surface with no limit on the location of the landing sites, and they will remain on the lunar surface for longer periods of time, exploring more of the lunar surface per trip than did their Apollo predecessors. Future explorers also will determine if lunar resources can be used to reduce the amount of supplies brought from Earth.

Initially, robotic missions will survey and characterize potential lunar landing sites, including sites that could become long-term lunar outposts. These robotic missions will include orbiters to provide total coverage of the Moon and take measurements to characterize the Moon's surface and the space environment in support of science objectives.

NASA will develop and test technologies for in situ resource utilization so astronauts can "live off the land." In the long term, this capability will reduce the amount of supplies and consumables launched from Earth to the Moon, and eventually to Mars, making space exploration more affordable and sustainable. Technology development will include excavation systems, volatile material extraction systems, and other technologies to reduce logistics requirements for lunar habitats. In the future, in situ resource utilization systems also may be used to produce propellants and oxygen from lunar resources (regolith and potentially ice) to meet the needs of lunar outpost crews.

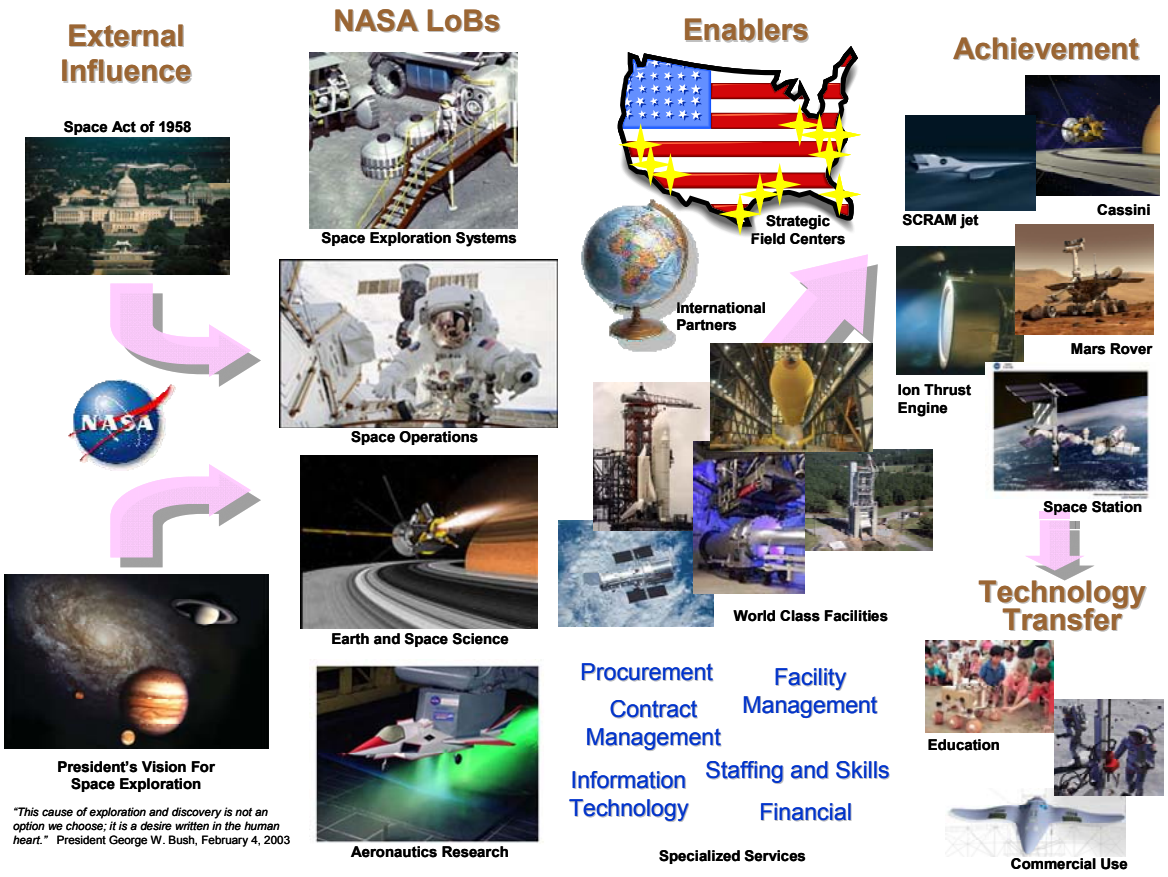
Since capable space communication is a prerequisite for future lunar and Mars missions, as well as robotic exploration of the solar system, NASA established an Agency-wide Space Communications Architecture Working Group (SCAWG) to address future communication needs. The SCAWG is developing five-year “snapshots” of the space communication architecture, evolving from the present Deep Space Network, Space Network, and Ground Network to ensure the continued availability of space communication and navigation capabilities that exist today and to address deficiencies in that capability that must be resolved for the near-term lunar exploration program. In addition, the SCAWG is identifying both a suitable communication architecture for longer-term Mars exploration efforts and ways in which the lunar communication architecture can evolve smoothly through the next stage of exploration initiatives.

NASA plans to initiate a research and development program to develop nuclear technologies essential to achieving the goals of long-duration stays on the lunar surface and exploration of Mars. In the near-term, nuclear technology development will focus on developing a technology roadmap for fission surface power systems. An essential feature of this roadmap will be a clear path for selecting a fuel system and power conversion combination that will meet lunar exploration requirements and be adaptable to a Martian environment.

Baseline Architecture

Figure 3 below is an overview of NASA's baseline architecture.

Figure 3: NASA Baseline Architecture



The Baseline illustration indicates that the business process flow for NASA has five elements or phases. *External Influences and Key Drivers* reflects the external and internal plans or directives which inform NASA's business strategy. Examples of these influences include the Space Act of 1958, the 2004 national Vision for Space Exploration, the 2006 Strategic Plan, and the 1998 International Space Station Agreement. All NASA investments are formulated within this phase.

Lines of Business are those program-level activities deployed by NASA to help achieve its objectives.

Enablers are the facilities, cross-cutting functions, and partnerships NASA relies upon to implement its Programs. Examples of enablers include all of NASA's ten field Centers and their component facilities; the Department of Defense and other federal business partners; United Space Alliance and other support service contractors; and Russia, Canada, Europe, Japan and other international partners.

Achievements are the outputs of the foregoing processes. NASA's accomplishments are recorded, measured, and communicated to fulfill oversight reporting requirements, such as the Performance Accountability Report (PAR) and the Government Performance Results Act (GPRA). Accomplishment reporting helps measure the cost of performance for each strategic goal and sub-goal.

Technology Transfer is outcome of the achievements. NASA's charter is to "…provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof."[9]

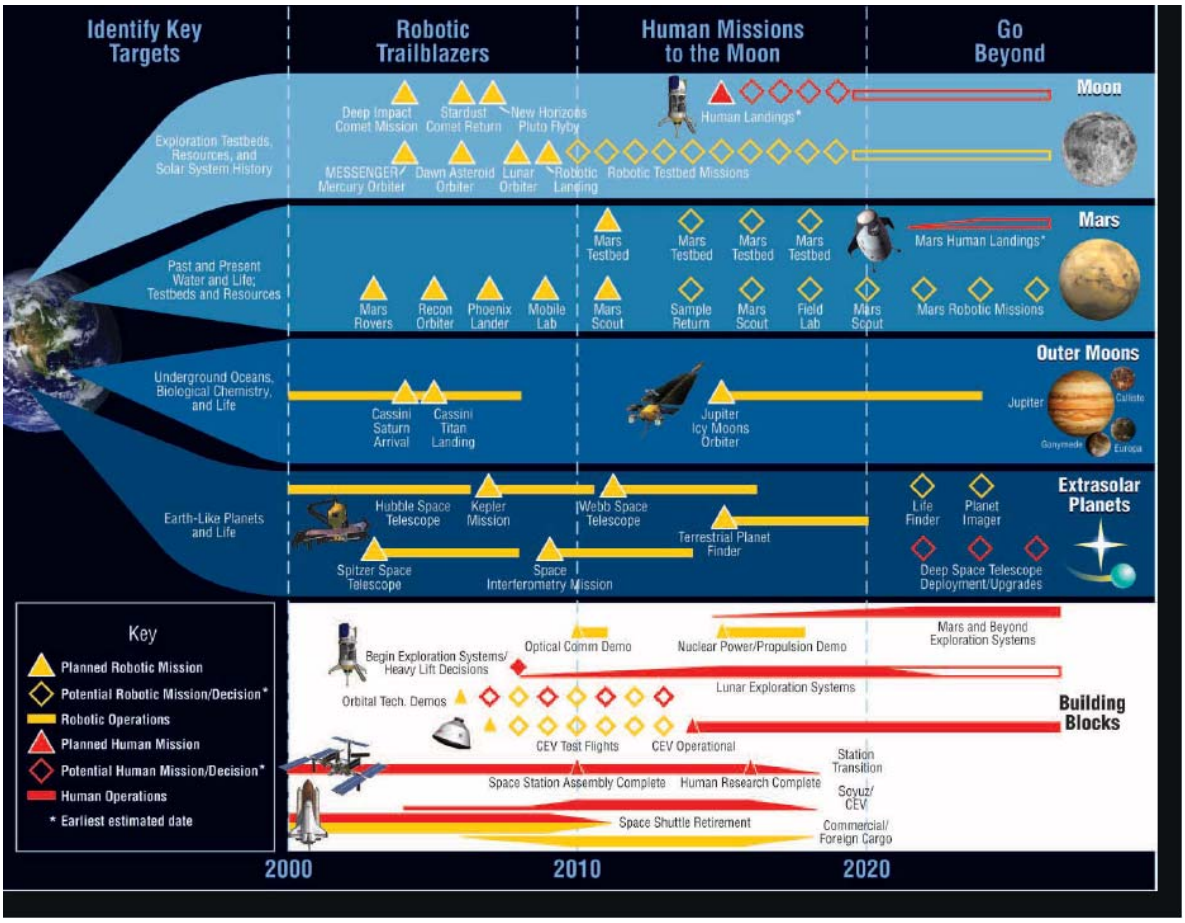
[9] National Aeronautics and Space Act of 1958, Sec. 203. (a) (3).

Enterprise Sequencing Plan

A high-level, agency-wide view of modernization activities, outlining the relative prioritization and sequencing of enterprise segments, programs and projects, and relationships between activities.

Figure 4 below is an integrated view of NASA's major activities and milestones that will achieve the NASA vision.

Figure 4: NASA's Major Activities and Milestones that will Achieve the NASA Vision[10]



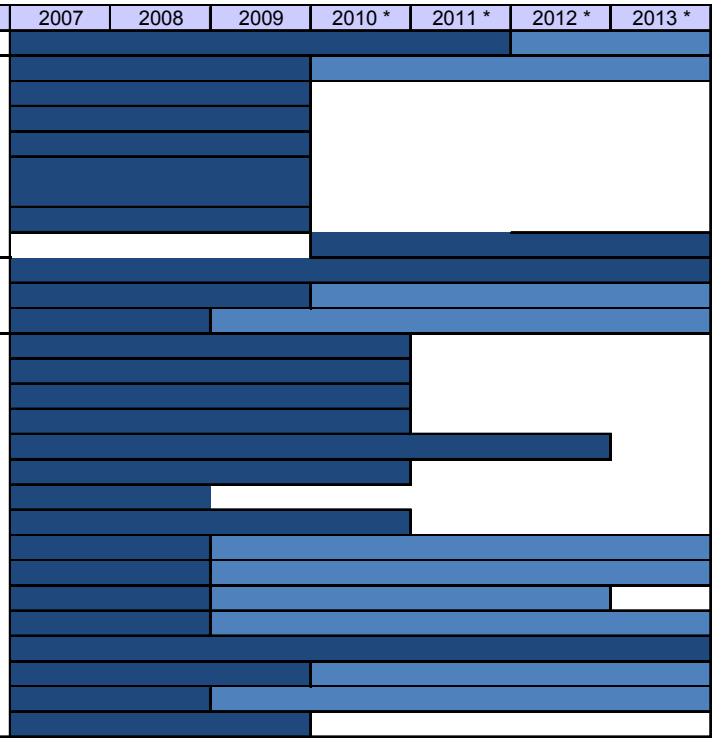
[10] *The Vision for Space Exploration February 2004* page4

The IT Investment Sequencing Plan, Table 1 below illustrates the sequencing of NASA's major IT investments organized by segment. The Estimated life cycle and contract term information for the investments is from the Final BY09 OMB 300s.

Table 1: IT Investment Sequencing Plan

Major IT Investment Sequencing Plan

Segment	Investment
Exploration Systems	ESMD - Integrated Collaborative Environment
Mission Support	NASA Data Center
	NASA Integrated Enterprise Management - Aircraft Management Module
	NASA Integrated Enterprise Management - Core Financial
	NASA Integrated Enterprise Management - Human Capital Information Environment
	NASA Integrated Enterprise Management - Integrated Asset Management - Property, Plant & Equipment (IAM_PP&E)
	NASA Office Automation, IT Infrastructure, and Telecommunications
	Agency IT Services
Science	ARC Shared Capability Asset Program (SCAP) HECC MPIT
	GSFC Earth Observing Sys Data Info Sys
	NASA Center for Computational Sciences
Space Operations	Shuttle Launch Control System
	Space Shuttle Program Flight Software
	Space Shuttle Program Integration
	Shuttle Integrated Logistics
	Shuttle Processing Support
	Shuttle Ground Operations
	Shuttle Ground Camera
	Shuttle Flight Operations
	Mission Control Center
	Integrated Planning System
	ISS Production Facility
	ISS Payload Operations and Integration Center
	ISS Software Development/Integration Laboratory
	Deep Space Network
	Near Earth Network (formerly Space and Ground Network)
	NASA Integrated Services Network



* Estimates for BY+1 and beyond are for planning purposes only and do not represent budget decisions.

Performance Improvement Summary

The Performance Improvement Summary includes the FY07 actual results for major IT investments. The performance targets meet on time at target levels are shown in green. The targets meet late or not at the level predicted are shown in yellow. Additional detail regarding these results is included in the Segment Architecture sections of this document and the corresponding Segment Architecture documents.

Table 2: Performance Improvement Summary

Segment	Investment	TBD	Yes	Yes (Late)	Yes (Not level predicted)
Exploration Systems	ESMD - Integrated Collaborative Environment		2		2
Mission Support	NASA Data Center		8		
	NASA Integrated Enterprise Management - Aircraft Management Module	1	3		
	NASA Integrated Enterprise Management - Core Financial		10		7
	NASA Integrated Enterprise Management - Human Capital Information Environment	2	1		1
	NASA Office Automation, IT Infrastructure, and Telecommunications		8		
Science	ARC Shared Capability Asset Program (SCAP) HECC MPIT		7		
	GSFC Earth Observing Sys Data Info Sys		7		
	NASA Center for Computational Sciences		4		
Space Operations	Shuttle Launch Control System		5		
	Space Shuttle Program Flight Software		4		2
	Space Shuttle Program Integration		6		
	Shuttle Integrated Logistics		6		
	Shuttle Processing Support		5		
	Shuttle Ground Operations		5		
	Shuttle Flight Operations		4		1
	Mission Control Center		2		2
	Integrated Planning System		4		
	ISS Production Facility		4		
	ISS Payload Operations and Integration Center		8		
	ISS Software Development/Integration Laboratory		4		
	Deep Space Network	4	4		
	Near Earth Network (formerly Space and Ground Network IT Support)		4		1
	NASA Integrated Services Network		8	1	

Target Architecture

The Annotated Target Architecture illustration indicates the new development of core segment architectures for each of NASA's lines of business, and updating NASA's cross-cutting mission support segment architecture. When completed, these segment architectures will represent the integrated execution of programs, plans, and operation activities that will enable achievement of the Vision for Space Exploration.

The segment architectures are guided by a prescribed structure to ensure that the descriptions of business areas, services, and investments can be viewed commonly across all segments so that common business processes and shared capabilities can be more easily identified. And, a common vocabulary for enterprise architecture is now integrated into the NASA lexicon. When completed, these core segments will help facilitate how NASA's strategies, business areas, services, and investments are integrated and aligned strategically to improve core mission performance. The Mission Support segment is helping to integrate the cross-cutting, enterprise-wide facilities, functions, and partnerships.

NASA's Target State Technology Transfer will include a Lunar Return mission. NASA and its space transportation partners will be major participants in the lunar return mission. NASA's Space Shuttle program and manifests will be decommissioned for the entire space shuttle fleet. A complete transition of materials, personnel, data, and, most importantly, knowledge will go to the Constellation and successor Programs, ushering a new era of launch vehicles, supply vehicles, and interplanetary spacecraft for human space flight.

Figure 5: Annotated NASA Target Architecture

Target Performance

The performance indicators identified and reported for the major IT investments in relation to the Federal Performance Reference Model for BY09 are summarized in the table below. This table is included to support analysis of performance measurement and to help support performance improvement. The performance measures used should be in alignment with the performance improvement goals of the agency and individual segments. More detail regarding the performance architecture for the mission support segment is available in the Mission Support Service Segment document.

Table 3: Target Performance Indicators for Major IT Investments

			Exploration Systems	Mission Support							Science			Space Operations																		Grand Total
			ESMD - Integrated Collaborative Environment	NASA Data Center	NASA Integrated Enterprise Management - Aircraft Management Module	NASA Integrated Enterprise Management - Core Financial	NASA Integrated Enterprise Management - Human Capital Information Environment	NASA Integrated Enterprise Management - Integrated Asset Management - Property, Plant & Equipment (IAM_PP&E)	NASA Office Automation, IT Infrastructure, and Telecommunications		ARC Shared Capability Asset Program (SCAP) HECC MPIT	GSFC Earth Observing Sys Data Info Sys	NASA Center for Computational Sciences	Deep Space Network	Integrated Planning System	ISS Payload Operations and Integration Center	ISS Production Facility	ISS Software Development/Integration Laboratory	Mission Control Center	NASA Integrated Services Network	Near Earth Network (formerly Space and Ground Network IT Support)	Shuttle Flight Operations	Shuttle Ground Operations	Shuttle Integrated Logistics	Shuttle Launch Control System	Shuttle Processing Support	Space Shuttle Program Flight Software	Space Shuttle Program Integration		
Customer Results	Customer Benefit	Customer Complaints						1																								1
		Customer Impact or Burden																														
		Customer Retention																														
		Customer Satisfaction		1			1			1		1	1				1	1					1			1	1			1	12
		Customer Training	1																													1
	Service Accessibility	Access						1		2		1									1											5
		Automation																														
		Integration																														
		Service Availability		1										2		1				1												5
	Service Coverage	Frequency and Depth																			1											1
		New Customers and Market Penetration																			1											1
		Service Efficiency									1											1										2
	Service Quality	Accuracy of Service or Product Delivered						1								1				1												3
	Timeliness and Responsiveness	Delivery Time													1			1					1	1	1	1	1	1	8
		Response Time			1														1	1										3
Customer Results Total			1	2	1	1	3	2	1		3	1	1	2	1	3	1	1	1	3	3	1	2	1	2	2	1	2		42

Table 3: Target Performance Indicators for Major IT Investments

			Exploration Systems	Mission Support										Science			Space Operations																		Grand Total
			ESMD - Integrated Collaborative Environment	NASA Data Center	NASA Integrated Enterprise Management - Aircraft Management Module	NASA Integrated Enterprise Management - Core Financial	NASA Integrated Enterprise Management - Human Capital Information Environment	NASA Integrated Enterprise Management - Integrated Asset Management - Property, Plant & Equipment (IAM_PP&E)	NASA Office Automation, IT Infrastructure, and Telecommunications					ARC Shared Capability Asset Program (SCAP)	HECC MPIT	GSFC Earth Observing Sys Data Info Sys	NASA Center for Computational Sciences	Deep Space Network	Integrated Planning System	ISS Payload Operations and Integration Center	ISS Production Facility	ISS Software Development/Integration Laboratory	Mission Control Center	NASA Integrated Services Network	Near Earth Network (formerly Space and Ground Network IT Support)	Shuttle Flight Operations	Shuttle Ground Operations	Shuttle Integrated Logistics	Shuttle Launch Control System	Shuttle Processing Support	Space Shuttle Program Flight Software	Space Shuttle Program Integration	
Mission and Business Results	Administrative Management	Facilities, Fleet, And Equipment Management												1																				1
		Help Desk Services				1																													1
		Security Management																																	
		Travel																																	
		Workplace Policy Development And Management																																	
	Community and Social Services																																		
	Controls and Oversight	Corrective Action																																	
		Program Evaluation							1																										1
		Program Monitoring			1																														1
	Correctional Activities																																		
	Defense and National Security																																		
	Disaster Management																																		
	Economic Development																																		
	Education																																		
	Energy																																		
	Environmental Management																																		
	Financial Management	Accounting																																	
		Asset and Liability Management																																	
		Collections and Receivables																																	
		Cost Accounting / Performance Measurement																																	
		Funds Control																																	
		Payments																																	
		Reporting and Information							1																										1
	General Government																																		
	General Science and Innovation	Scientific and Technological Research and Innovation												2					1	1															4
		Space Exploration and Innovation												2			1		1																4
	Health																																		
	Homeland Security																																		
	Income Security																																		
	Information and Technology Management	Information Management	1											1			1						1												4
		Information Security																																	
		Information Sharing																																	
		Information Systems Security												1																					1
		IT Infrastructure Maintenance		2																															2
		Lifecycle/Change Management																																	
		Record Retention																																	
		System and Network Monitoring																																	
		System Development																																	
		System Maintenance																																	
	Intelligence Operations																																		
	Internal Risk Management and Mitigation																																		
	International Affairs and Commerce																																		
	Law Enforcement																																		
	Legislative Relations																																		
	Litigation and Judicial Activities																																		
	Natural Resources																																		
	Planning and Budgeting	Budget and Performance Integration																																	
		Budget Execution																																	
		Budget Formulation																																	
		Capital Planning																																	
		Enterprise Architecture																																	
		Management Improvement							1																										1
		Strategic Planning																																	
		Tax and Fiscal Policy																																	
		Workforce Planning																																	
	Regulatory Development																																		
	Revenue Collection																																		
	Supply Chain Management	Goods Acquisition														1																			1
		Inventory Control																																	
		Logistics Management																																	
		Services Acquisition																																	
	Transportation	Air Transportation																																	
		Ground Transportation																																	
		Space Operations																1				1	1		1	1	3	1	1	1	1			12
		Water Transportation																																	
	Workforce Management																																		
	(blank)	HR Strategy					1																												1
		Official Information Dissemination												1																					1
		Organization and Position Management					1																												1
		Staff Acquisition					1																												1
Mission and Business Results Total			1	2	1	1	3		2	1				6	2	1		2	1		2	1		1	1	1		1	1	3	1	1	1	1	38

Table 3: Target Performance Indicators for Major IT Investments

			Exploration Systems	Mission Support							Science			Space Operations																							Grand Total
			ESMD - Integrated Collaborative Environment	NASA Data Center	NASA Integrated Enterprise Management - Aircraft Management Module	NASA Integrated Enterprise Management - Core Financial	NASA Integrated Enterprise Management - Human Capital Information Environment	NASA Integrated Enterprise Management - Integrated Asset Management - Property, Plant & Equipment (IAM_PP&E)	NASA Office Automation, IT Infrastructure, and Telecommunications		ARC Shared Capability Asset Program (SCAP) HECC MPIT	GSFC Earth Observing Sys Data Info Sys	NASA Center for Computational Sciences	Deep Space Network	Integrated Planning System	ISS Payload Operations and Integration Center	ISS Production Facility	ISS Software Development/Integration Laboratory	Mission Control Center	NASA Integrated Services Network	Near Earth Network (formerly Space and Ground Network IT Support)	Shuttle Flight Operations	Shuttle Ground Operations	Shuttle Integrated Logistics	Shuttle Launch Control System	Shuttle Processing Support	Space Shuttle Program Flight Software	Space Shuttle Program Integration						
Processes and Activities	Cycle Time and Timeliness	Cycle Time						1		1																										2
		Timeliness		1						1		1																								3
	Management and Innovation	Compliance																																		
		Innovation and Improvement							1	1						1					1															4
		Knowledge Management																																		
		Participation	1	1																																2
		Policies												1																						1
		Risk																																		
	Productivity	Efficiency					1	1			1																									3
		Efficiency																																		
		Efficiency																																		
		Productivity			1								1																							2
	Quality	Complaints																						1	1	1	1									4
		Errors						1							1		1		1	1			2						3	1						11
	Security and Privacy	Privacy																																		
		Security								2						1					1															4
Processes and Activities Total			1	2	1	1	3		2	4	1	1	1	1	1	2	1	1	1	1	1	2	1	1	1	1	3	1							36
Technology	Effectiveness	IT Contribution to Process, Customer, or Mission									1																									1
		User Requirements														1																					1
		User Satisfaction																																		
	Efficiency	Accessibility	1								2																									3
		Interoperability																																		
		Load levels		1									1																							2
		System Response Time															1				1															2
		Data Standardization or Tagging																																		
	Information and Data	Data Storage									1																									1
		External Data Sharing										1																								1
		Internal Data Sharing						2		1	1																									4
	Quality Assurance	Functionality																																		
		IT Composition																																		
		Standards Compliance and Deviations		1						2																										3
	Reliability and Availability	Availability			1		1		1		1			2	1				1	1		1		1	1	1	1	1	1							16
		Reliability																																		
	Technology Costs	Licensing Costs																																		
		Operations and Maintenance Costs										1																								1
		Overall Costs																																		
		Support Costs																																		
		Training and User Costs																																		
Technology Total			1	2	1	1	3		2	2	7	2	1	2	1		1	1	1	1	1		1		1	1	1	1	1	2					38
Grand Total			4	8	4	4	12		8	8	17	6	4	7	4		8	4	4	4	6		5	4	5	6	5	5	6	6					154

Target Services

The table below summarizes the services provided by NASA's BY09 Major IT investments. Greater detail regarding these services is included in the Segment Architectures.

Table 4: Target Services NASA's BY09 Major IT Investments

			Exploration Systems	Mission Support										Science			Space Operations														
Service Domain	Service Type	Component	ESMD - Integrated Collaborative Environment	NASA Data Center	NASA Integrated Enterprise Management - Aircraft Management Module	NASA Integrated Enterprise Management - Core Financial	NASA Integrated Enterprise Management - Human Capital	NASA Integrated Enterprise Information Environment	NASA Integrated Enterprise Management - Integrated Asset Management - Property, Plant & Equipment (IAM PP&E)	NASA Office Automation, IT Infrastructure, and Telecommunications	ARC Shared Capability Asset Program (SCAP) HECC MPIT	GSFC Earth Observing Sys Data Info Sys	NASA Center for Computational Sciences	Near Earth Network	Integrated Planning System	Shuttle Ground Operations	Shuttle Launch Control System	Deep Space Network	Mission Control Center	Shuttle Processing Support	Space Shuttle Program Flight Software	ISS Production Facility	Space Shuttle Program Integration	ISS Software Development/Integration Laboratory	Shuttle Integrated Logistics	NASA Integrated Services Network	Shuttle Flight Operations	ISS Payload Operations and Integration Center	Grand Total
Back Office Services	Asset / Materials Management	Asset Cataloging / Identification							2															2				4
		Asset Transfer, Allocation, and Maintenance							5															1				6
		Computers / Automation Management																1				1						2
		Facilities Management		1																1								2
		NEW		1																								1
		Property / Asset Management							9									1										10
	Asset/Materials Management	Computers/Automation Management									1																	1
		Facilities Management									2																	2
		Property/Asset Management									1																	1
	Data Management	Data Classification										1																1
		Data Exchange				1	1					1				1											2	6
		Data Recovery										1				1				1	1		1					5
		Data Warehouse						1				1		1		1		1								1	1	7
		Extraction and Transformation										1																1
		Loading and Archiving										1				1												2
		Meta Data Management																									1	1
		NEW		2																								2
		Data Mart																										
		Data Cleansing																										
	Development and Integration	Data Integration													1				1				1				1	4
		Enterprise Application Integration	1																									1
		Instrumentation and Testing													1			1	1	1					1	1		6
		Legacy Integration													1				1			1						3
		Software Development													1				1		1	1				1		5
	Financial Management	Activity-Based Management																							1			1
		Auditing															1											1
		Billing and Accounting						15									1											16
		Credit / Charge						1																				1
		Debt Collection						1																				1
		Expense Management						5																				5
		Payment / Settlement						13																				13
		Payroll															1											1
		Currency Translation																										
		Internal Controls																										
		Revenue Management																										
	Human Capital / Workforce Management	Resource Planning and Allocation																1										1
		Workforce Acquisition / Optimization																1										1
		Workforce Directory / Locator																1										1
		Workforce Acquisition /Optimization																										
		Contingent Workforce Management																										
		Team / Org Management																										
		Skills Management																										
	Human Resources																											

Table 4: Target Services NASA's BY09 Major IT Investments (continued)

			Exploration Systems	Mission Support										Science			Space Operations														
Service Domain	Service Type	Component	ESMD - Integrated Collaborative Environment	NASA Data Center	NASA Integrated Enterprise Management - Aircraft Management Module	NASA Integrated Enterprise Management - Core Financial	NASA Integrated Enterprise Management - Human Capital	NASA Integrated Enterprise Management - Information Environment	NASA Integrated Enterprise Management - Integrated Asset	NASA Integrated Enterprise Management - Property, Plant & Equipment (IAM PP&E)	NASA Office Automation, IT Infrastructure, and Telecommunications	ARC Shared Capability Asset Program (SCAP) HECC MPIT	GSFC Earth Observing Sys Data Info Sys	NASA Center for Computational Sciences	Near Earth Network	Integrated Planning System	Shuttle Ground Operations	Shuttle Launch Control System	Deep Space Network	Mission Control Center	Shuttle Processing Support	Space Shuttle Program Flight Software	ISS Production Facility	Space Shuttle Program Integration	ISS Software Development/Integration Laboratory	Shuttle Integrated Logistics	NASA Integrated Services Network	Shuttle Flight Operations	ISS Payload Operations and Integration Center	Grand Total
Business Analytical Services	Analysis and Statistics	Forensics																	1											1
		Mathematical										2				1	1	1	1	1	1									8
		Radiological																			1									1
		Structural / Thermal															1				1									2
	Business Intelligence	Balanced Scorecard															1				1									2
		Decision Support and Planning															1	1			1									3
		Demand Forecasting / Mgmt															1	1	2		1									5
	Knowledge Discovery	Data Mining										1																		1
		Information Sharing										1																		1
		Modeling										1		1			1	1			1							1		6
		Simulation										1					1													2
	Reporting	Ad Hoc					4												2											6
		OLAP					5																							5
		Standardized / Canned					4																							4
	Visualization	CAD															1	1	1		1									4
		Graphing / Charting															1	1	1		1									4
		Imagery														1	1	1		1	1									5
		Multimedia															1				1									2
		Mapping / Geospatial / Elevation /GPS																												
	Visualization	Imagery										1																		1
Business Management Services	Investment Management	Performance Management									1						1	1			1					1				5
		Portfolio Management									2						1													3
		Strategic Planning and Mgmt										2					1	1	1		1					1				7
		Strategic Planning & Mgmt																												
	Management of Process	Business Rule Management																												
		Change Management									2																			2
		Configuration Management									3																			3
		Governance / Policy Management									1																			1
		Program / Project Management									2																			2
		Quality Management									2																			2
		Requirements Management									1																			1
		Risk Management									1																			1
	Management of Processes	Business Rule Management															1	1												2
		Change Management	1														1	1	1			1		1						6
		Configuration Management	1										1			1	1	1	1	1		1						1	1	10
		Governance / Policy Management															1	1												2
		Program / Project Management	1													1	1	1	1		1							1		7
		Program/Project Management										1																		1
		Quality Management	1														1	1	1					1		1				6
		Requirements Management	1									1					1	1	1					1				1		7
		Risk Management										1					1	1	1		1			1		1				7
	Organizational Management	Network Management		1									1		1	1	1	1		1							1			8
		Workgroup / Groupware									3						1	1	1		1									7
	Supply Chain Management	Catalog Management											1				1		1											3
		Invoice / Requisition Tracking and Approval															1									1	1			3
		Ordering / Purchasing															1									1	1			3
		Procurement				1	1										1		1							1	1			6
		Returns Management																								1				1
		Sourcing Management															1									1	1			3
		Storefront / Shopping Cart																	1											1
		Warehouse management Logistics and Transportation Inventory management																												

Table 4: Target Services NASA's BY09 Major IT Investments (continued)

			Exploration Systems	Mission Support									Science			Space Operations														
Service Domain	Service Type	Component	ESMD - Integrated Collaborative Environment	NASA Data Center	NASA Integrated Enterprise Management - Aircraft Management Module	NASA Integrated Enterprise Management - Core Financial	NASA Integrated Enterprise Management - Human Capital Information Environment	NASA Integrated Enterprise Management - Integrated Asset Management - Property, Plant & Equipment (IAM PP&E)	NASA Office Automation, IT Infrastructure, and Telecommunications	ARC Shared Capability Asset Program (SCAP) HECC MPIT	GSFC Earth Observing Sys Data Info Sys	NASA Center for Computational Sciences	Near Earth Network	Integrated Planning System	Shuttle Ground Operations	Shuttle Launch Control System	Deep Space Network	Mission Control Center	Shuttle Processing Support	Space Shuttle Program Flight Software	ISS Production Facility	Space Shuttle Program Integration	ISS Software Development/Integration Laboratory	Shuttle Integrated Logistics	NASA Integrated Services Network	Shuttle Flight Operations	ISS Payload Operations and Integration Center	Grand Total
Customer Services	Customer Initiated Assistance	Assistance Request									2				1														3
		Online Help							2						1														3
		Online Tutorials							1						1														2
		Reservations / Registration													1														1
		Scheduling									1		1																2
		Self-Service							4			1																	5
		Multi-Lingual Support																											
	Customer Preferences	Alerts and Notifications							2																				2
		Personalization													1														1
		Subscriptions																											
	Customer Relationship Management	Call Center Management							1						1										1				3
		Contact and Profile Management							1		1				1								1						4
		Customer / Account Management							2		1				1									1					5
		Customer Feedback							1		1				1	1							1						5
		NEW																		3	2		2						7
		Partner Relationship Management							1		1		1		1	1													5
		Product Management	1												1								1						3
		Sales and Marketing									1																		1
		Surveys							2		1				1														4
		Customer Analytics																											
		Brand Management																											
Digital Asset Services	Content Management	Content Authoring													1	1	1												3
		Content Publishing and Delivery													1														1
		Content Review and Approval													1	1													2
		Syndication Management													1														1
		Tagging and Aggregation										1			1														2
	Document Management	Classification													1	1					1								3
		Document Conversion													1	1					1								3
		Document Imaging and OCR													1	1					1								3
		Document Referencing													1	1	1				1								4
		Document Review and Approval			1		1								1	1			1		1								6
		Document Revisions			1		1				1				1	1					1								6
		Indexing													1	1					1								3
		Library / Storage										1		1	1	1		1	1		1								7
	Knowledge Management	Categorization													1														1
		Information Mapping / Taxonomy													1				1										2
		Information Retrieval										1	1		1	1			1									3	8
		Information Sharing									1	1	1	1	1	1	1	1								1			9
		Knowledge Capture										1	1		1				1										4
		Knowledge Distribution and Delivery																	1										1
		Knowledge Engineering													1		1		1										3
		Smart Documents																											
	Records Management	Digital Rights Management													1														1
		Document Classification													1	1													2
		Document Retirement													1	1													2
		Record Linking / Association													1	1	1												3

Table 4: Target Services NASA's BY09 Major IT Investments (continued)

			Exploration Systems	Mission Support										Science		Space Operations															
Service Domain	Service Type	Component	ESMD - Integrated Collaborative Environment	NASA Data Center	NASA Integrated Enterprise Management - Aircraft Management Module	NASA Integrated Enterprise Management - Core Financial	NASA Integrated Enterprise Management - Human Capital	NASA Integrated Enterprise Management - Information Environment	NASA Integrated Enterprise Management - Integrated Asset Management - Property, Plant & Equipment (IAM PP&E)	NASA Office Automation, IT Infrastructure, and Telecommunications	ARC Shared Capability Asset Program (SCAP) HECC MPIT	GSFC Earth Observing Sys Data Info Sys	NASA Center for Computational Sciences	Near Earth Network	Integrated Planning System	Shuttle Ground Operations	Shuttle Launch Control System	Deep Space Network	Mission Control Center	Shuttle Processing Support	Space Shuttle Program Flight Software	ISS Production Facility	Space Shuttle Program Integration	ISS Software Development/Integration Laboratory	Shuttle Integrated Logistics	NASA Integrated Services Network	Shuttle Flight Operations	ISS Payload Operations and Integration Center	Grand Total
Process Automation	Routing and Scheduling	Inbound Correspondence Management														1	1			1										3
		NEW												1																1
		Outbound Correspondence Management														1	1			1										3
	Tracking and Workflow	Case Management														1	1			1										3
		Conflict Resolution														1	1													2
		Process Tracking	1			1		1		2		1				1	1	1		1									1	11
Support Services	Collaboration	Email																1												1
		Shared Calendaring																1												1
		Threaded Discussions	1							1																				2
		Document Library																												
		Task Management																												
	Communication	Audio Conferencing																1							1				2
		Computer / Telephony Integration																							1					1
		Computer/Telephony Integration										1																		1
		Video Conferencing																1							1				2
		Voice Communications												1				1							1			1	4
		Instant Messaging																												
		Event / News Management																												
		Community Management																												
		Real Time / Chat																												
	Security Management	Access Control		1						2		1			1			1	1	1	1	2		1			12
		Audit Trail Capture and Analysis								6		1			1			1			1		1	1				12
		Certification and Accrediation										1																		1
		Certification and Accreditation																							1					1
		FISMA Management and Reporting										1													1					2
		Identification and Authentication								8					1			1	1	1		1		1					14
		Incident Response										1													1					2
		Intrusion Detection								1		1			1			1		1	1		1	1					8
		Intrusion Prevention										1													1					2
		NEW		1																										1
		Virus Protection										1																		1
		Digital Signature Management																												
		Cryptography																												
	Systems Management	License Management										1								1	1		1							4
		Remote Systems Control								3				1				1												5
		Software Distribution										1			1					1										3
		System Resource Monitoring								2		2								1	1	1	1			1				9
		Issue Tracking																												
	Forms Management	Forms Creation																												
		Forms Modification																												
	Search	Classification																												
		Precision / Recall Ranking																												
		Query																												
		Pattern Matching																												

Target Technical Architecture

The table below summarizes the technology provided by NASA's BY09 Major IT investments. Greater detail regarding these services is included in the Segment Architectures.

Table 5: Target Technical Architecture NASA's BY09 Major IT Investments

			Exploration Systems	Mission Support						Science			Space Operations														
Service Area	Service Category	Service Standard	ESMD - Integrated Collaborative Environment	NASA Data Center	NASA Integrated Enterprise Management - Aircraft Management Module	NASA Integrated Enterprise Management - Core Financial	NASA Integrated Enterprise Management - Human Capital Information Environment	NASA Integrated Enterprise Management - Integrated Asset Management - Property, Plant & Equipment (IAM_PP&E)	NASA Office Automation, IT Infrastructure, and Telecommunications	ARC Shared Capability Asset Program (SCAP) HECC MPIT	GSFC Earth Observing Sys Data Info Sys	NASA Center for Computational Sciences	Deep Space Network	Integrated Planning System	ISS Payload Operations and Integration Center	ISS Production Facility	ISS Software Development/Integration Laboratory	Mission Control Center	NASA Integrated Services Network	Near Earth Network	Shuttle Flight Operations	Shuttle Ground Operations	Shuttle Integrated Logistics	Shuttle Launch Control System	Shuttle Processing Support	Space Shuttle Program Flight Software	Space Shuttle Program Integration
Component Framework	Business Logic	Platform Dependent								1		2									1						1
		Platform Independent			1					3		1		3							1						
	Data Interchange	Data Exchange				2	2	2	8																1		1
	Data Management	Database Connectivity				1	1	1				1	1														
		Reporting and Analysis				1	1	1	5	2																	
	Presentation / Interface	Content Rendering								1		1										1	1	1	1		1
		Dynamic Server-Side Display								1	1											1	1	1	1		
		Static Display				1		1													1	1		1	1		
		Wireless / Mobile / Voice																				1		1	1		
	Security	Certificates / Digital Signature							1																		
		Certificates / Digital Signatures									1						1					1		1	1		1
		Support Security Services								3																	
		Supporting Security Services				2	1	2	1	1	1	1		2		2	2	4	3			1	1	1	1	1	
Component Framework Total					1	7	5	7	15	12	3	6	1	5		2	3	4	3		3	6	3	6	7	1	4
Service Access and Delivery	Access Channels	Collaboration / Communications							11	5	1	3	1				1				1	1			1	1	1
		Other Electronic Channels				2	1	4			1	1			1					1	1	1			1		
		Web Browser			5	4	1	4				2	1		1		1				1	1	1	1	1		1
		Wireless / PDA										1					1					1		1	1		1
	Delivery Channels	Extranet															1				1	1		1			1
		Internet									1	1			3		1		1		1	2	1	1		1	1
		Intranet			4	6	3	6			1		1						1	1	1			1	1		
		Peer to Peer (P2P)																	1			1		1	1		
		Virtual Private Network (VPN)															1		1		2	1	1	1	1		1
	Service Requirements	Authentication / Single Sign-on	1			2		2	4			1				3	4					1		1		1	1
		Authentication/Single Sign-on								2																	
		Hosting				4	2	4								2	3				2	1	1	1	1	1	1
		Legislative / Compliance			8	8	3	8		1	1										1	1		1			1
		Legislative/Compliance								1																	
	Service Transport	Service Transport			12	6	5	5			1			1	1				1	1	1						
		Supporting Network Services				4	2	3	5	1	1	2					1		2		1	1	1	1	1	1	1
Service Access and Delivery Total			1		29	36	17	36	20	10	7	11	3	1	6	5	14		7	3	13	13	5	11	9	5	10
Service Interface and Integration	Integration	Enterprise Application Integration				1	1	1										2				1	1	1	1		
		Middleware				1	2	1			1	1								1	1	1		1	1		1
	Interface	Service Description / Interface							4		1											1		1			
		Service Discovery							5		1											1		1	1		
	Interoperability	Data Format / Classification							2		1	2								1	1	2		2	1		1
		Data Transformation																			1	1		1	1		1
		Data Types / Validation									1											1		1	1		1
Service Interface and Integration Total						2	3	2	11		5	3						2		2	3	8	1	8	6		4
Service Platform and Infrastructure	Database / Storage	Database	2			1	1	1		4	3	2	2	5	1	2	3	3			2	1	1	1	1	1	1
		Storage	1			1		1		1	1	7	1	4	2	2	3	4			1	1	1	1	1	1	1
	Delivery Servers	Application Servers	6									1			2	2	3				3					1	1
		Media Servers																			1					1	
		Portal Servers	1									1									1						
		Web Servers	1			2		2		1		1	1		1					1	2						
	Hardware / Infrastructure	Embedded Technology Devices		1							1	6								1	1	1		1	1		
		Local Area Network (LAN)		1						1	1			1	5			3			1	1	1	1	1	1	
		Network Devices / Standards		1							1				1				1	1	1	1	1	1	1	1	
		Peripherals		1								6		1			1	1			1	1		1	1	1	1
		Servers / Computers		1		1	1	1	4	2	1	4	1	1	3	2	3	2		1	1	1	1	1	1	1	1
		Video Conferencing																	2			1		1	1		
		Wide Area Network (WAN)			3	1	1	1		1					1				1		1	1	1	1			
	Software Engineering	Integrated Development Environment				1		1	1	2		1			2		1	1			1					1	1
		Modeling								2	1	1									1	1		1			1
		Software Configuration Management	1			1		1		4	1	2	1	1	4			1			2						1
		Test Management				1		1		2	1			1				1			2	1	1	1	1	1	1
	Support Platforms	Platform Dependent				3		3			2	1			1		1			1	3						1
		Platform Independent	1		3	3	1	3			1	2			1		1			1							1
Service Platform and Infrastructure Total			13	5	6	15	4	15	5	20	14	35	6	14	24	8	16	16	4	6	25	11	7	11	9	10	11
Grand Total			14	5	36	60	29	60	51	42	29	55	10	20	30	15	33	22	14	11	44	38	16	36	31	16	29

Cross-Agency Initiative Integration Summary

This section is a consolidated view of planned activities and milestones to implement mandatory and informational cross-agency initiatives described in the Federal Transition Framework (FTF) Catalog, E-Gov initiatives, and other mandated initiatives from the President's Management Agenda.

Table 6: Alignment of NASA's budget submissions with FTF cross-agency initiatives

Cross Agency Initiative	Budget Formulation & Execution Line of Business	Case Management (CM) Line of Business (LoB)	Disaster Management	E-Authentication	E-Travel	Federal Health Architecture (FHA)	Financial Management (FM) Line of Business	Geospatial (Geospatial LOB)	Geospatial One-Stop	Grants Management Line of Business (GM LOB)	Grants.gov	HSPD-12	Human Resources (HR) Line of Business	Information Sharing Environment	Information Systems Security Line of Business	Integrated Acquisition Environment (IAE)	Internet Protocol Version 6 (IPv6)	IT Infrastructure Line of Business (LoB)
Program																		
Integrated Enterprise Management Program	x				x		x						x			x		
NASA Integrated Information Infrastructure Program				x								x						x
Earth Science Multi-Mission Operations Program								x	x									
Applied Sciences Program			x															
Space Communications Program																	x	

*Shading indicates FTF Cross-Agency Initiatives not applicable to NASA according to FTF_Catalog_PDF_Ver10_Final_Dec_2006.pdf

Table 7: Alignment of NASA's Budget Submissions

Cross Agency Initiative	Budget Formulation & Execution Line of Business *	Case Management (CM) Line of Business (LoB) *	Disaster Management	E-Authentication	E-Travel *	Federal Health Architecture (FHA)	Financial Management (FM) Line of Business	Geospatial (Geospatial LOB)	Geospatial One-Stop	Grants Management Line of Business (GM LOB) *	Grants.gov	HSPD-12 *	Human Resources (HR) Line of Business	Information Sharing Environment *	Information Systems Security Line of Business	Integrated Acquisition Environment (IAE)	Internet Protocol Version 6 (IPv6) *	IT Infrastructure Line of Business (LoB) *
Investment																		
ARC Shared Capability Asset Program (SCAP) HECC MPIT																		
ESMD - Integrated Collaborative Environment																		
GSFC Earth Observing Sys Data Info Sys.								x	x									
GSFC NASA Center for Computational Sciences																		
Space and Ground Network																		
Shuttle Flight Operations																		
Integrated Planning System																		
Mission Control Center																		
ISS Software Development/Integration Laboratory																		
Space Shuttle Program Flight Software																		
Space Shuttle Program Integration																		
ISS Production Facility																		
Shuttle Ground Camera																		
Shuttle Ground Operations																		
Shuttle Integrated Logistics																		
Shuttle Launch Control System																		
Shuttle Processing Support																		
NASA Integrated Enterprise Management - Aircraft Management Module																		
NASA Integrated Enterprise Management - Core Financial	x						x											
NASA Integrated Enterprise Management - Human Capital Information Environment													x					
NASA Integrated Enterprise Management - Integrated Asset Management																		
NASA Office Automation, IT Infrastructure, and Telecommunications				x								x						x
Deep Space Network																		
NASA Integrated Services Network																	x	

* Unknown SRM Mapping of FTF initiative

e-GOV[11]

E-Gov is about using technology to its fullest to provide services and information that is centered on citizen groups. The goal is to eliminate redundant systems and significantly improve the government's quality of customer service. The following are investments working towards that goal.

NASA is participating in 16 of the original 24 Presidential E-Gov Initiatives plus the E-Authentication crosscutting initiative. Eleven of the initiatives are in steady-state mode, while five are in development or in the process of migration. In addition, NASA is actively engaged in five of the six initial Federal Lines of Business (LoB) initiatives, and is currently exploring potential opportunities for the three newest LoBs (IT Infrastructure, Geospatial, and Budget Formulation and Execution).

Figure 6: E-Gov: Initiative Implementation Milestones

E-Gov Initiatives	FY 2007				FY 2008				FY 2009				FY 2010				FY 2011				FY 2012				FY 2013			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Business Gateway																												
Disaster Management																												
E-Authentication			MS																									
E-Clearance									FA	SS																		
Enterprise HR Integration				FA	SS																							
E-Payroll																												
E-Records Management																												
E-Rulemaking																												
E-Training																												
E-Travel	MS			FA	SD	SS																						
Federal Asset Sales	FA	SS																										
Geospatial One Stop																												
Grants.gov																												
Integrated Acquisition Env.	SS	SD																										
Recruitment One Stop																												
SAFECOM																												
USA Services																												
Financial Mgmt LOB											MS									FA	SD	SS						
Grants Mgmt LOB				MS								FA	SD	SS														
Federal Health Architecture LOB	MS																											
Human Resources LOB			MS					FA	SD	SS																		
IT Infrastructure LOB			MS					FA	SS																			
Budget Formulation LOB					MS																							
IT Security LOB		MS						FA	SD	SS																		

MS Implementation / Migration Start
FA Implementation Complete / Functionality Available
SS Initiative in Steady State / Operations & Maintenance Mode
SD Duplicative Systems Shut Down *

***NOTE:** For several of the Initiatives, NASA does not have an existing system needing to be shut down.

[11] From *FY 08-09 IBPD_Egov only_final*.doc

IPv6

NASA is following OMB's guidance for IPv6 migration through its three-phase approach. It is the intention of NASA to have implemented, by the June 30, 2008 deadline, the ability to transmit an IPv6 packet from a NASA Center Local Area Network (LAN) to a NASA Center LAN or from a NASA Center LAN to an IPv6 enabled external connection (Federal, Research or Commercial). To ensure no disruption of legacy services, NASA's networks will operate in a dual-stack mode.

Table 8: Mandatory OMB IPv6 Milestones

Status	Requirement	Due Date
Completed	Assign an official to lead and coordinate agency planning	November 15, 2005
Completed	Complete an inventory of existing routers, switches and hardware firewalls	November 15, 2005
Completed	Begin an inventory of all other existing IP compliant devices and technologies not captured in the first inventory	November 15, 2005
Completed	Begin impact analysis to determine fiscal and operational impacts and risks of migrating to IPv6	November 15, 2005
Completed	Using the guidance issued by the Chief Information Officers Council Architecture and Infrastructure Committee, address each of the elements defined in the mandate's attachment C in your agency's IPv6 transition plan and provide the completed IPv6 transition plan as part of the agency's Enterprise Architecture (EA) submission to OMB.	February 27, 2006
Completed	Provide a progress report on the inventory and impact analysis, as part of the agency's EA submission to OMB.	February 27, 2006
Completed	Complete inventory of existing IP compliant devices and technologies not captured in first inventory	June 30, 2006
Completed	Complete impact analysis of fiscal and operational impacts and risks	June 30, 2006
	All agency infrastructures (network backbones) must be using IPv6 and agency networks must interface with this infrastructure. Agencies will include progress reports on meeting this target date as part of their EA transition strategy.	June 30, 2008

Table 9: Proposed IPv6 Working Group Milestones

Status	Recommendation	Due Date
Completed	Demonstrate Readiness	Q2 FY2007
Completed	Submit Design for Core	Q3 FY2007
Completed	Validation of Transition Scenario(s)	Q3 FY2007
Completed	Submit Pilot/Test Plan	Q4 FY2007
Completed	Validation of Service Provider Transitions	Q4 FY2007
Completed	Equipment Upgrades/Replacements Complete	Q1 FY2008
Completed	Report Results of Pilot/Tests	Q2 FY2008
	Capability Demonstrations	Q3 FY2008

HSPD-12

Homeland Security President's Directive (HSPD-12) enables validated workers to access Agency assets (physical and logical) that are required in the performance of their jobs, and protect assets from unauthorized access, damage, and destruction. Requirements include:

- Identity is verified using sound criteria
- Identity integrity is maintained
- Identity is authenticated electronically
- Credentials are issued by an accredited process

Additional detailed information is provided in the Mission Support Segment Architecture document.

Segment Architecture Overview

OMB defines a segment as "individual elements of the enterprise describing core mission areas, and common or shared business services and enterprise services. Segments are defined by the enterprise architecture.[12]" For more on NASA's segment architectures see *FY 2008 Enterprise Architecture Program: Executive Overview.*

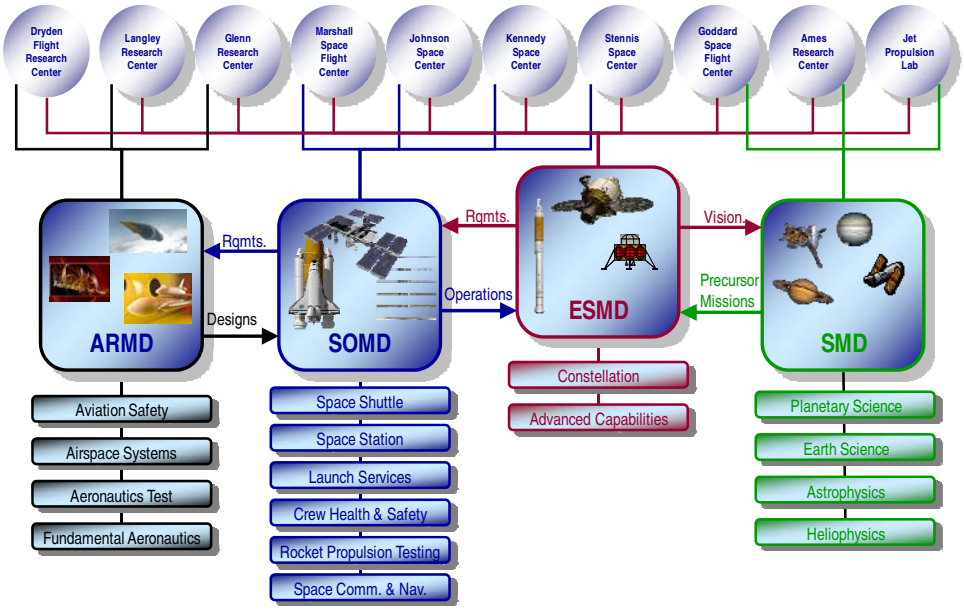
NASA's four Mission Directorates define the Agency's major Lines of Business (LoBs) or Core Mission Segments. These represent the execution of programs, plans, and operation activities that will enable achievement of the Vision for Space Exploration. The LoB's are:

- Exploration Systems Mission Directorate (ESMD)
- Science Mission Directorate (SMD)
- Space Operations Mission Directorate (SOMD)
- Aeronautics Research Mission Directorate (ARMD)

The Enterprise Service Segment Type (see Figure 13: Mission Support Segment) represents the common or shared IT services supporting core mission areas and business services that make up:

- Mission Support Service Segment

NASA's Mission Directorates use all eleven of NASA's Field Centers in the execution of their respective goals and objectives. The matrix below illustrates how each of NASA's Mission Directorates used each NASA Field Center. A shaded cell represents Center participation with a Mission Directorate.



[12] *FEA Practice Guidance*

Exploration Systems Mission Directorate

The Exploration Systems Mission Directorate (ESMD) develops capabilities and supporting research and technology that enable sustained and affordable human and robotic exploration. ESMD is also developing a robotic precursor mission, human transportation elements, and life support systems for the near-term goal of lunar exploration.[13]

ESMD Projects

ESMD relies on the capabilities and services of all NASA Centers and Component facilities to achieve its mission. The projects managed by ESMD are listed below.

ESMD Integrated Collaborative Environment

The Integrated Collaborative Environment (ICE) Program[14] provides a common repository for all authoritative data for ESMD. ICE responds to the Columbia Accident Investigation Board's (CAIB) lessons learned and recommendations. ICE is used by industry, academia, and government for sharing, collaborating, integrating, accessing and controlling management information and product data definition for all ESMD products. The scope of ICE includes all requirements, schedule, risk, and configuration management information for all engineering design, analysis, and test products. It will:

- Improve mission assurance and mission safety achieved by availability of all data related to ESMD products during ESMD operations;
- Reduce program/project performance risk by providing better program visibility, control and decisions throughout the program life cycle;
- Compress program/project delivery schedules by providing a single collaboration environment enabling the compression of numerous critical process life cycles; and
- Reduce program costs by improving communication amongst the various systems and sub systems along for faster incorporation of designs and completion of tasks.

Table 10: ICE Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)	X	**Strategic Goal Supported: #4** Bring a new Crew Exploration Vehicle into service as soon as possible after Shuttle retirement. **Strategic Goal Supported: #4** Encourage the pursuit of appropriate partnerships with the emerging commercial space sector. **Strategic Goal Supported: #6** Establish a lunar return program having the maximum possible utility for later missions to Mars and other destinations.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

[13] *Fiscal Year 2009 Budget Estimates*
[14] Integrated Collaborative Environment information is available in NASA ProSight.

Table 11: 2007 Performance Results for Integrated Collaborative Environment

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Technology	Efficiency	Accessibility	Percentage of registered users accessing the system per hour	Percentage of registered users accessing the system per hour	Raise to 45%	45%	Yes
Customer Results	Customer Benefit	Customer Training	Attendance Percentage	Percentage of registered users against users who have attended ICE user training	Raise to 40%	25%	Yes - Not level predicted
Mission and Business Results	Information and Technology Management	Information Management	Percentage of Data Availability	Percentage of ESMD data available through ICE	Maintain 70%	70%	Yes
Processes and Activities	Management and Innovation	Participation	Participation-Percentage of Exploration workers actively using the ICE environment	Participation-Percentage of Exploration workers actively using the ICE environment	Improve to 75%	70%	Yes - Not level predicted

Science Mission Directorate

The Science Mission Directorate (SMD) conducts scientific exploration, enabled by access to space or near-space, to help NASA achieve Strategic Goal 3. SMD's four science Sub-goals under Strategic Goal 3 are focused through a "Theme" as follows:

- Earth Science Theme: "Study Earth from space to advance scientific understanding and meet societal needs.";
- Planetary Science Theme: "Advance scientific knowledge of the origin and history of the solar system, the potential for life elsewhere, and the hazards and resources present as humans explore space.";
- Heliophysics Theme: "Understand the Sun and its effects on Earth and the solar system."; and
- Astrophysics Theme: "Discover the origin, structure, evolution, and destiny of the universe, and search for Earth-like planets."[15]

Science Mission Directorate (SMD) – Sponsored Projects

The Science Mission Directorate, through its robotic missions and space observatories, will continue to collect key data and provide stunning images of distant galaxies and planets in the solar system, including Earth.

GSFC Earth Observing System Data Information System

The Earth Observing System (EOS) Data and Information System (EOSDIS)[16] is a comprehensive distributed system designed to support NASA's EOS. Since 1994, EOSDIS has been archiving, managing, and distributing Earth science data from NASA missions and provided spacecraft control and science data processing. EOSDIS provides data to a broad user community, enabling research, applications, education and policy analysis. EOSDIS is the key system in NASA that performs the end-to-end

[15] *FY2009 Budget Estimates*
[16] GSFC Earth Observing Sys Data Info Sys information is available in NASA ProSight.

functions for ensuring that the value NASA's Earth science missions is fully realized by the community.

Table 12: EOSDIS Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)	X	**Strategic Goal Supported: #3** Develop a balanced overall program of science, exploration, and aeronautics consistent with the redirection of the human spaceflight program to focus on exploration.

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

Table 13: 2007 Performance Results for GSFC Earth Observing Sys Data Info Sys

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Technology	Information and Data	External Data Sharing	ECHO services access method	Access to ECHO is by native ECHO APIs XML services	Provide access to all ECHO services via web services standards.	The operational version of ECHO (Version 9.0) replaced custom APIs with web services.	Yes
Technology	Technology Costs	Operations and Maintenance Costs	Number of operations and sustaining engineering staff.	FY2006 staffing across sites	Reduce number by 10 FTE	Staffing was reduced by 10 FTE in FY2007 (estimated based on information thru end of June)	Yes
Customer Results	Customer Benefit	Customer Satisfaction	Federal Government Average score for American Customer Satisfaction Index (ACSI)	Federal Government Average score for American Customer Satisfaction Index (ACSI) for FY2006 was 71	Exceed the Federal Government Average score for the Average Customer Satisfaction Index (ACSI) of 71	EOSDIS ACSI measured in September 2006 was 74. Survey for FY 07 will be conducted later in the year.	Yes
Customer Results	Service Coverage	New Customers and Market Penetration	Number of distinct users	2,964,337 distinct users were supported in 2006	Increase number of distinct users (OMB-approved Program Assessment Rating Tool (PART) measure for this project.)	3.2M distinct users (extrapolated from actuals through the end of June)	Yes
Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	Number of users that receive EOSDIS data	Number of users that received EOSDIS data in FY2006 is 163,154 distinct users	Maintain or increase the number of users who receive EOSDIS data	Number of distinct users who received data in FY2007 is 175K (extrapolated from actuals through the end of June)	Yes
Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	Number of products distributed	65,431,648 products were distributed in FY2006	Maintain or increase the number of products distributed	100M products were distributed in FY2007 (extrapolated from actuals through end of June)	Yes
Processes and Activities	Cycle Time and Timeliness	Timeliness	Average time to respond to users	Average time to respond to users in FY2006 was one day when manual intervention is involved. However, usage of Data Pools for electronic access to data has increased, and in those cases the response to users occurs within a few minutes.	Maintain or decrease the average time it takes to respond to users	Average time it takes to respond to users in FY2007 is one day when manual intervention is involved. However, usage of Data Pools for electronic access to data has increased, and in those cases the response to users occurs within a few minutes.	Yes

GSFC NASA Center for Computational Sciences

The NASA Center for Computational Sciences (NCCS)[17] supports primary scientific modeling in Earth and space sciences, engineering applications, and the exploration initiative. The NCCS is a key resource in the effort to restore international leadership to the U.S. program in weather and climate prediction, to increase the understanding of Earth's climate system, natural and human influences on climate, and consequences for life on Earth. NCCS system applications will lead to greater understanding of the Earth system, the solar system, and the universe through computational use of space-borne observations and computer modeling. NCCS is an ongoing operational data center, with cyclical acquisition of supercomputer systems and contract services.

Table 14: NCCS Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)	X	**Strategic Goal Supported: #3** Develop a balanced overall program of science, exploration, and aeronautics consistent with the redirection of the human spaceflight program to focus on exploration.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

Table 15: 2007 Performance Results for NASA Center for Computational Sciences

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Technology	Efficiency	Load levels	Load Levels - Factor 2a - Net TeraFlops	2.9	Achieve 5.5	17.6	Yes
Customer Results	Customer Benefit	Customer Satisfaction	Customer Satisfaction - Factor 3a - User Support & Factor 6a - System Administration	~ 80%	Maintain 90%	90%	Yes
Mission and Business Results	Supply Chain Management	Goods Acquisition	Goods Acquisition - Factor 5a - Acquisition Support	~80%	Maintain 90%	95%	Yes
Processes and Activities	Productivity	Productivity	Productivity - Factor 1 - HPC Return on Investment / Total Cost of Ownership	100%	200%	719%	Yes

[17] GSFC NASA Center for Computational Sciences information is available in NASA ProSight.

ARC Shared Capability Asset Program (SCAP) HECC MPIT

The NASA High End Computing Columbia (HECC)[18] Project provides an integrated environment that includes high-speed access to cutting edge High End Computing (HEC) platforms, assistance with application porting and scaling, data storage, pre- and post-processing support, visualization, training and online and help desk support. These features are enabling a factor of 10-100 advances in vehicle, earth, space, and life sciences modeling, and allow NASA's scientific users to do more rapid, cost-effective R&D. This investment closes, in part, an identified agency performance gap. In December 2005, the strategic council chose to incorporate the HECC Project as a part of SCAP, recognizing its priority in NASA's ongoing technology investment.

Table 16: HECC Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)	X	**Strategic Goal Supported: #3** Develop a balanced overall program of science, exploration, and aeronautics consistent with the redirection of the human spaceflight program to focus on exploration.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[18] ARC Shared Capability Asset Program (SCAP) HECC MPIT information is available in NASA ProSight.

Table 17: 2007 Performance Results ARC Shared Capability Asset Program (SCAP) HECC MPIT

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Customer Results	Service Accessibility	Access	Availability - System Availability	Exceeds 75%.	90%	For 3/1/05 - 2/28/07, total system availability was 95.59% (production systems: 96.57%, 2048: 91.42%).	Yes
Technology	Reliability and Availability	Availability	System Utilization	More than 75% of Mission Directorate allotments	Maintain 75% of Mission Directorate allotments during this transition year as the Columbia supercomputer is being upgraded.	Maintain 75% of Mission Directorate allotments during this transition year as the Columbia supercomputer is being upgraded.	Yes
Technology	Reliability and Availability	Availability	Reliability - System MTBF (Mean Time Between Failures)	New System (no baseline)	14 Days MTBF on 512 Processor Systems	From 05/01/2006-04/30/2007, the MTBF on 512 processor systems averaged 17.3 days, exceeding the required standard	Yes
Customer Results	Customer Benefit	Customer Satisfaction	Number of new development and engineering projects on Columbia.	Number of new development and engineering projects on Columbia in FY06.	5% increase in the number of new development and engineering projects on Columbia.	15% increase in the number of new development and engineering projects	Yes
Processes and Activities	Productivity	Efficiency	System Performance	Current system cost/performance	Demonstrate system cost/performance enhancement of "Columbia Follow On" (CFO).	Initial evaluation system for CFO has been purchased. Its target expansion capability will be 60% of Columbia. Verification of system performance should be received by 8/1/07. This more than doubles price performance.	Yes
Mission and Business Results	Information and Technology Management	Information Systems Security	Security Policies, Plans, and Implementation	Maintain 100% compliance with security policies, maintaining system and facility security plans, support rapid response to Security Audits and Incidents.	Continue to maintain 100% compliance with security policies, update system and facility security plans, and maintain 24-hour response capability and timely solution to security incidents.	Accomplished 100% compliance with security policies with no security incidents causing system disruption.	Yes
Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	Continue to maintain 100% compliance with security policies, update system and facility security plans, and maintain 24-hour response capability and timely solution to security incidents	Continue to meet prioritized computing demand on Columbia in support of NASA's strategic goals #1, #3 and #4 during this transition year.	Continue to meet prioritized computing demand on Columbia in support of NASA's strategic goals #1, #3 and #4 during this transition year.	Columbia remained stable with improved utilization in 2007. It has supported every shuttle mission, provided SMD, ESMD & ARMD HEC cycles to support a balanced program, and met ESMD's increasing demands to support CEV & CLV.	Yes

Space Operations Mission Directorate[19]

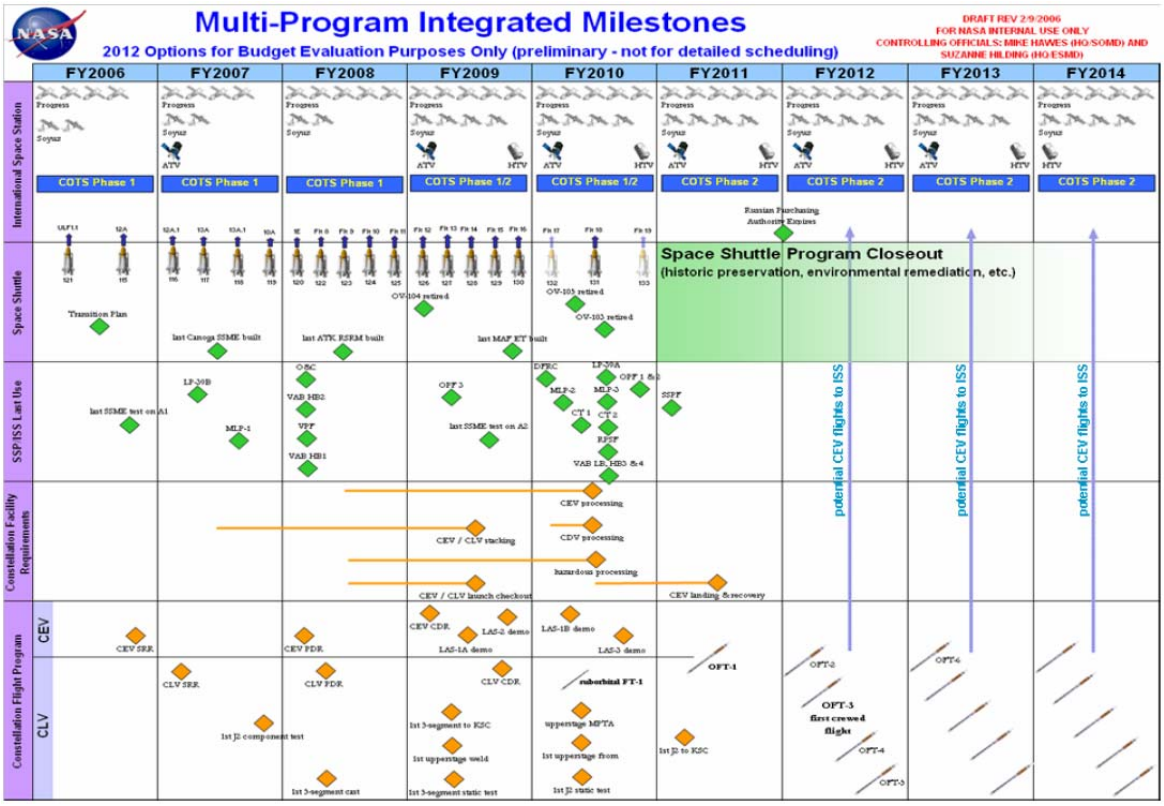
The Space Operations Mission Directorate (SOMD) is responsible for providing mission critical space exploration services to both NASA customers and to other partners within the United States and throughout the world: flying the Space Shuttle to assemble the International Space Station; ensuring safe and reliable access to space; maintaining secure and dependable communications between platforms across the solar system; and ensuring the health and safety of our Nation's astronauts.

At the heart of SOMD is nearly half a century of experience at safely and reliably building, flying, and maintaining some of the world's most advanced and complex aerospace systems. The Vision for Space Exploration and the NASA Strategic Plan recognize the role of the International Space Station as a unique orbital outpost for carrying out the scientific and engineering research needed for prolonged stays on the Moon and Mars. The lessons being learned during the construction and operation of the International Space Station are directly applicable to the challenges that may be faced by explorers on the lunar and Martian surfaces.[20]

SOMD has been aggressively planning and iterating on the development of its transition strategy. The Multi-Program Integrated Milestone chart in Figure 7: SOMD Multi-Program Integrated Milestones below illustrates the extensive planning and sequencing of activities being planned across SOMD's major space flight program areas through 2020.

[19] Information derived from the SOMD Segment Architecture, version 2.0
[20] *FY2009 Budget Estimates*

Figure 7: SOMD Multi-Program Integrated Milestones



The full size version of the chart is available upon request. All figures in this section are copied from the SOMD Segment Architecture document and are available upon request.

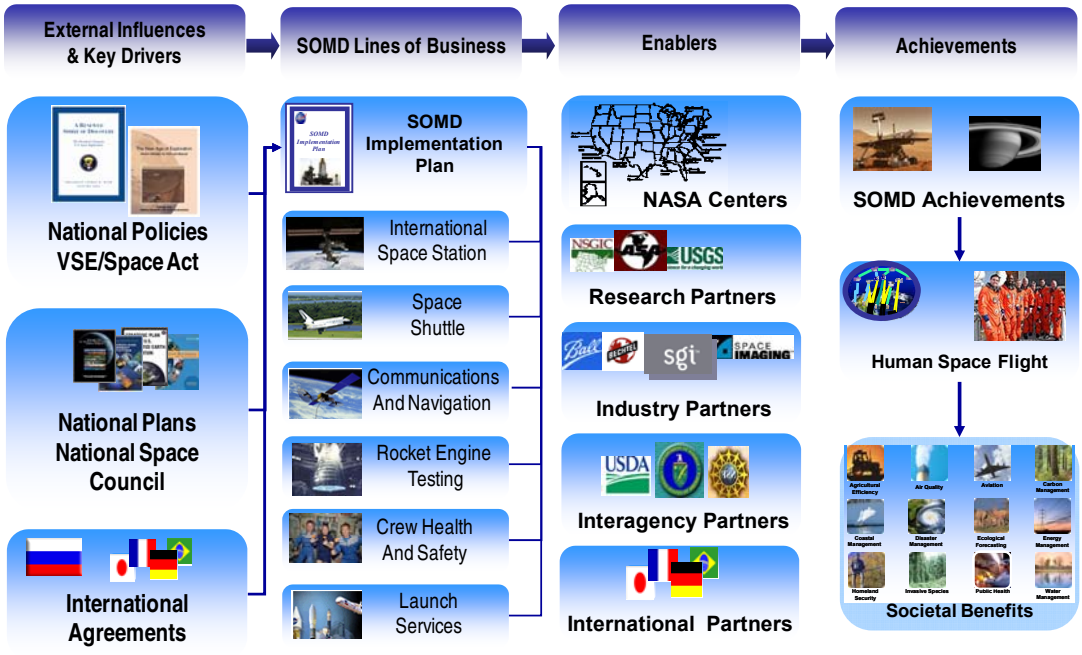
SOMD achieves its transformation goals through four primary functions, as illustrated in Figure 8: SOMD Primary Functions below. The first function, External Influences and Key Drivers, reflects the internal and external influences that guide SOMD's business strategy in the execution of its mission areas. Examples of these influences include National policies, international agreements, and risk and safety management. All of SOMD's future state investments are formulated within this function.

The second function, Lines of Business, details those program-level activities deployed by SOMD to help achieve the objectives stated within its implementation plan. This function details program elements such as performance goals, funding levels, resource commitments, facilities, and workforce strategies that will be deployed to help accomplish the objectives of the program.

The third function, Enablers, lists the facilities, partnerships, services, and capabilities that SOMD relies upon to help achieve its tactical business goals. Examples of enablers include all of NASA's ten field Centers and their component facilities, federal business partners, support service contractors, and international partners such as Russia, Canada, Europe, and Japan.

The fourth function, Achievements, details the accomplishments of all SOMD activities. These accomplishments are recorded, measured, and communicated to fulfill reporting requirements for such oversight areas as the Performance Accountability Report (PAR) and the Government Performance Results Act (GPRA). Accomplishment reporting helps measure the cost of performance for each strategic goal and sub-goal, based on NASA's lines of business that reflect the costs associated with the Agency's Mission Directorate.

Figure 8: SOMD Primary Functions



The Program view of SOMD details the current state, target state, and transition strategy for each program area within the Mission Directorate. SOMD delivers its services and achieves its performance goals through six Programs as illustrated in Figure 9: Program view of SOMD below.

Figure 9: Program view of SOMD

 Space Shuttle	Enables NASA's vision and mission through advanced human exploration and providing safe access to space in support of human operations in low Earth orbit. Primary role is to complete the assembly of the Space Station. The Shuttle's phase out is planned for 2010.
 Space Station	Space Station involves a global partnership of 16 nations, requiring 40 Shuttle flights to deliver 100 Space Station components to orbit. The Space Station will accommodate research in biological and physical sciences, Earth and space observations, technology development.
 Launch Services	Ensures access to space on all available launch systems. These include the Space Shuttle, commercial and DOD launch vehicles, and foreign launch systems. Launch Services provides customer support for space access to all NASA Mission Directorates and other Government agencies, such as NOAA.
 Crew Health & Safety	Protects astronauts from the hazards of space travel and identifies methods that allow astronauts to improve their performance. CH&S systematically identifies and assesses critical health and safety risks and develops risk-management solutions that enhance human health, safety, and performance.
 Space Comm & Navigation	Provides policy formulation and the development and operation of NASA's space communications architecture. This architecture includes multiple radio communications networks and interconnected telecommunications capabilities that support operations in near-Earth orbit and deep space.
 Rocket Engine Testing	Provides the core engineering and technology base to operate, maintain, and enhance test facilities. The facilities test rocket engines and components used in current flight vehicles, including the Space Shuttle and commercial vehicles. They also test future rocket propulsion technologies and systems.

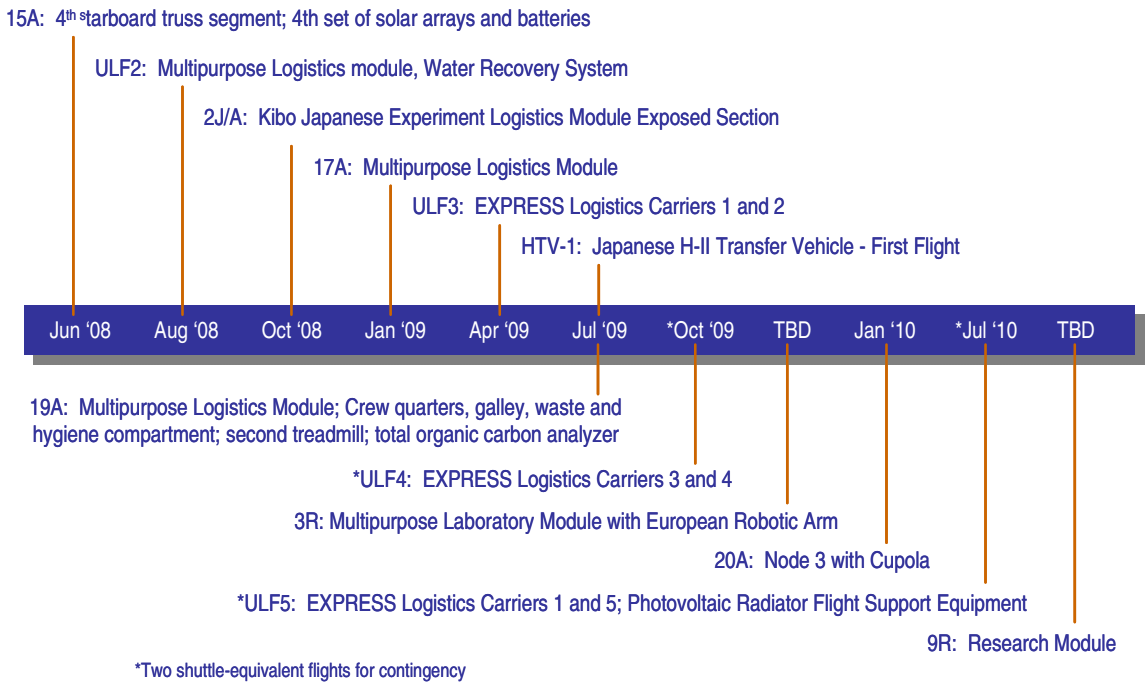
Space Shuttle Program Transition Strategy

The Space Shuttle Program (SSP) Transition Strategy is driven by the NASA Authorization Act of 2005 which directs the Administrator to "…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." The SSP will transition to the Constellation Program (CxP). Under CxP, crew launches will be supported by the ARES I rocket and cargo launches by the ARES V rocket.

International Space Station Transition Strategy

ISS elements will be delivered and assembled according to Figure 10: International Space Station Transition Strategy in the schedule below:

Figure 10: International Space Station Transition Strategy



Launch Services Transition Strategy

The LSP has earned a reputation as a highly-capable launch mission provider among its immediate customers, and as a leader in the pursuit of appropriate partnerships with the emerging commercial space sector. The LSP will continue the pursuit of commercial partnerships to help deliver on strategic goal #5. One method for proving the use of newer commercial technologies is through sponsored competitions such as the Centennial Challenge.

Since the beginning of the Centennial Challenges Program, NASA has conducted 10 competition events in six unique prize categories, five of which are related to space science or space exploration. Examples include Astronaut Glove (exploration), Regolith Excavation (exploration), Tether (science), Beam Power (exploration), and Lunar Lander (exploration).

By 2010, LSP's goal is to demonstrate one or more commercial space services for ISS cargo and/or crew transport. In August 2006, RpK and SpaceX entered funded Space Act Agreements with NASA to develop cargo transportation to and from low Earth orbit by 2010. In FY 2007, one company implemented the plans outlined in their agreement, while the other encountered difficulty and worked with the Agency on a resolution.

Additionally, NASA signed unfunded Space Act Agreements with companies developing and demonstrating their orbital transportation capabilities: PlanetSpace, Inc.; SpaceHab, Inc., SpaceDev, Inc., Transformational Space Corporation (t/space), and Constellation Services International, Inc. (CSI). By 2011, the goal is a robust series of

commercial launch services able to meet the wide range of Agency launch needs. By 2012, LSP's goal is the completion of one or more prize competitions for independently designed, developed, launched, and operated missions related to space science or space exploration.

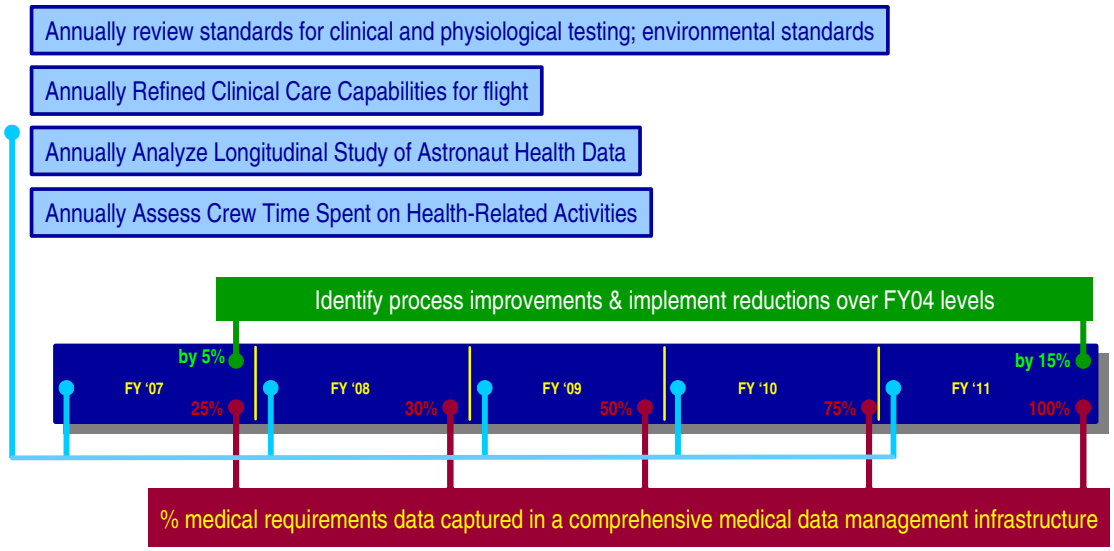
Rocket Propulsion Transition Strategy

The A-1 Test Stand at Stennis Space Center was officially turned over to NASA's Constellation Program to be converted from space shuttle main engine testing to test the J-2X engine. The J-2X will power the upper stage of NASA's next-generation crew launch vehicle, Ares I, and the Earth departure stage of the new cargo launch vehicle, Ares V. The main stage of the Ares V will be powered by five RS-68 engines. Those launch vehicles will help America fulfill its Vision for Space Exploration: to return to the moon by 2020, then travel to Mars and beyond.

Crew Health and Safety Transition Strategy

Figure 11: Crew Health and Safety Transition Strategy illustrates the near term transition activities to be completed through 2011. They focus on primarily on ensuring incremental improvement in processes over FY04 levels, and improving the percentage of medical requirements data captured in a comprehensive medical data management infrastructure.

Figure 11: Crew Health and Safety Transition Strategy

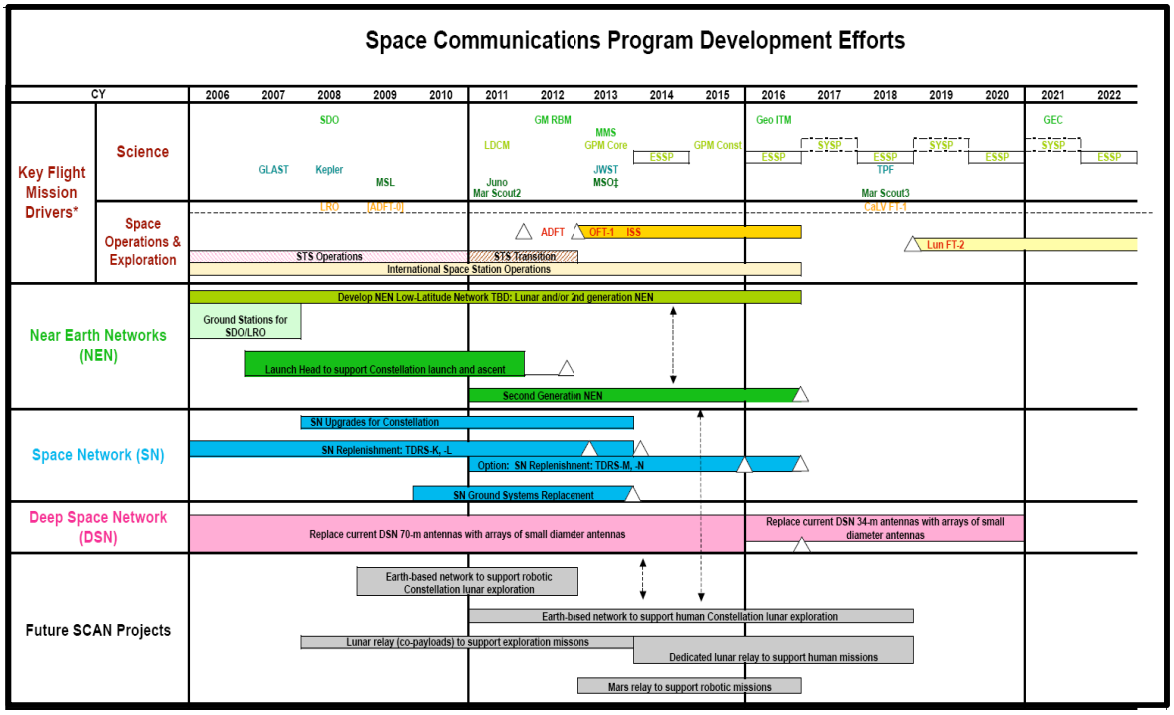


CHS has not formally developed its transition strategy to support the requirements of the Constellation program since those requirements are not yet defined. Obviously, SOMD intends for CHS to continue managing the health and safety of NASA's astronaut team after the Space Shuttle program ends and the Constellation Program emerges.

Space Communications and Navigation Transition Strategy

The SC Program determines its future activities based upon the needs of the missions contained in the SCMM, which is derived from the AMPM. As the AMPM and SCMM evolve, the SC Program will alter the schedule of its Development Efforts accordingly to ensure the needs of future space flight missions are fulfilled. Figure 12: Space Communication Program Development Efforts shows the schedule of SC Program Development Efforts based upon the current AMPM and SCMM.

Figure 12: Space Communication Program Development Efforts



Transition Strategies for Additional SOMD Projects

The projects below describe additional SOMD investments and their associated Transition Strategies. These are derived from investments described in SOMD's Exhibit 300's.

SOMD - Deep Space Network

The Deep Space Network[21] (DSN), in operation since the 1960s, provides critical communications and tracking for multiple spacecraft from three complexes located globally and operates year round 24 hours/7days to provide continuous contact with the spacecraft. The DSN fulfills NASA goals by supporting NASA deep space mission set, including NASA-funded missions and collaborative international missions. The DSN also serves as primary and backup facility for some high Earth-orbit and near-Earth missions. It currently supports more than 30 missions. The three DSN complexes are

[21] Deep Space Network DSN information is available in NASA ProSight.

located in Goldstone, California, Madrid, Spain, and Canberra, Australia. Other support facilities include the JPL Space Flight Operations Facility, a launch support facility located at KSC, and Emergency Control Center located at Goldstone, CA. The DSN also has been used as a science observatory for radar astronomy, radio science, and radio astronomy, making scientific observations that would advance sciences considered meritorious by NASA and the host countries. Nearly 70% of DSN funding is for operations and maintenance.

Table 18: Deep Space Network Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)	X	**Strategic Goal Supported: #3** Develop a balanced overall program of science, exploration, and aeronautics consistent with the redirection of the human spaceflight program to focus on exploration.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

Table 19: 2007 Performance Results for Deep Space Network

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Customer Results	Service Quality	Accuracy of Service or Product Delivered	the time to generate predicated parameters for asset configuration	1 day	1 hr	TBD	TBD
Technology	Reliability and Availability	Availability	Service Proficiency	98%	Maintain at current level	99%	Yes
Technology	Information and Data	Data Reliability and Quality	The accuracy of predicated parameters for configuring assets	frequency: 1.0hz; Pointing:0.001 deg	frequency: 0.005Hz; Pointing: 0.0005 deg	TBD	TBD
Customer Results	Service Accessibility	Service Availability	Space network availability	95%	Maintain at the same level	98.50%	Yes
Processes and Activities	Management and Innovation	Policies	Customer service agreements	Number of signed customer agreements: 24	Maintain at current level	34	Yes
Processes and Activities	Productivity	Productivity	The number of erroneous sets incurred by operators/planners	1 for evey 20 sets	1 for every 100 sets	TBD	TBD
Mission and Business Results	General Science and Innovation	Space Exploration and Innovation	Customers served	Number of deep space customers	Maintain at current level (assuming the number of missions requesting services does not decrease and the customers' requirements do not increase, then the DSN has sufficient funds to meet those commitments)	34 mission customers	Yes
Mission and Business Results	Planning and Budgeting	Workforce Planning	The percentage of operation personnel reduction for services preparation	100%	50-75%	TBD	TBD

Near Earth Network[22]

NASA's Near Earth Network, in operation with existing systems since the 1980s, provides simultaneous mission communications for multiple spacecraft from Space Network and Ground Network tracking stations. These communication facilities are operated and maintained for pre-launch checkout, launch and landing, and on-orbit tracking, telemetry data acquisition, and command services for crewed and robotic low-Earth orbiting spacecraft, and suborbital rockets, aircraft, and balloons. Without this investment, multi-billion dollar space assets cannot communicate their mission results back to Earth.

The Near Earth Network is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 20: Near Earth Network Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)	X	**Strategic Goal Supported: #3** Develop a balanced overall program of science, exploration, and aeronautics consistent with the redirection of the human spaceflight program to focus on exploration.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[22] GSFC Space and Ground Network IT Support information is available in NASA ProSight.

Table 21: 2007 Performance Results for Near Earth Network

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Processes and Activities	Quality	Errors	Mission Control Center Error Free Deliveries measures error free deliveries for Mission Control Center products that could impact system reliability & performance and safety (MCC Quality Metric).	100%	Maintain 100% error free	100.00%	Yes
Processes and Activities	Quality	Errors	Errors Number of open A Reports (ARs) against SSTF training s/w. The threshold for the expected number of open S/W ARs is 445. This is based on industry stds for the number of s/w errors as a function of the number of Source Lines Of Code	789	Maintain Threshold of 445, which requires an Reduction in software errors of 344.	689	Yes - Not level predicted
Technology	Reliability and Availability	Availability	Shuttle Mission Simulation Systems Availability with no impact to safety, mission success or major program schedule milestones.	99.54%	Maintain 97% Availability	99.40%	yes
Customer Results	Service Coverage	Service Efficiency	Software Production Facility Systems Availability with no impact to safety, mission success or major program schedule milestones.	100.00%	Maintain 98.5% Availability	100.00%	Yes
Mission and Business Results	Transportation	Space Operations	Flight Operations System Availability for the Shuttle Mission Simulator (SMS), Space Station Training Facility (SSTF), and Software Production Facility (SPF) with no impact to safety, mission success or major program schedule milestones.	99.43%	Maintain 98% Availability	99.40%	Yes

Shuttle Flight Operations[23]

The Space Shuttle and Space Station programs play a vital role in enabling NASA's vision and mission. This includes advancing human exploration and providing safe access to space in support of human operations in low-earth orbit Flight Operations (FO). FO achieves mission objectives by providing the products, services and facilities used to prepare and support such missions. The major functions for FO include management and integration, mission operations, vehicle operations, flight systems operations, flight control, flight crew and flight controller training functions, flight design and dynamic operations, preflight and flight control team functions, flight planning, payloads and assembly operations, crew procedures, and operational readiness for the Shuttle Program missions. Primary training facilities include the Shuttle Mission Training Facility and the Flight Operations Trainers.

The Flight Operations is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 22: Shuttle Flight Operations Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)		**Strategic Goal Supported: #1** Fly the Shuttle as safely as possible until its retirement, not later than 2010.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[23] JSC Flight Operations FO information is available in NASA ProSight.

Table 23: 2007 Performance Results for Shuttle Flight Operations

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Processes and Activities	Quality	Errors	Mission Control Center Error Free Deliveries measures error free deliveries for Mission Control Center products that could impact system reliability & performance and safety (MCC Quality Metric).	100%	Maintain 100% error free	100.00%	Yes
Processes and Activities	Quality	Errors	Errors Number of open A Reports (ARs) against SSTF training s/w. The threshold for the expected number of open S/W ARs is 445. This is based on industry stds for the number of s/w errors as a function of the number of Source Lines Of Code	789	Maintain Threshold of 445, which requires an Reduction in software errors of 344.	689	Yes - Not level predicted
Technology	Reliability and Availability	Availability	Shuttle Mission Simulation Systems Availability with no impact to safety, mission success or major program schedule milestones.	99.54%	Maintain 97% Availability	99.40%	yes
Customer Results	Service Coverage	Service Efficiency	Software Production Facility Systems Availability with no impact to safety, mission success or major program schedule milestones.	100.00%	Maintain 98.5% Availability	100.00%	Yes
Mission and Business Results	Transportation	Space Operations	Flight Operations System Availability for the Shuttle Mission Simulator (SMS), Space Station Training Facility (SSTF), and Software Production Facility (SPF) with no impact to safety, mission success or major program schedule milestones.	99.43%	Maintain 98% Availability	99.40%	Yes

Shuttle Ground Operations

Ground Operations[24] (GO) investment provides labor and hardware to maintain information technology in facilities that directly support launch preparation of the Space Shuttle. GO supports the Shuttle Program by providing vital instrumentation data from all ground support equipment during servicing, testing, and launch preparations. This investment covers platforms, LAN operations and associated maintenance of ADP hardware and software. It also covers operations and maintenance of Instrumentation systems such as the Ground Measurement System, Permanent Measuring System, Catenary Wire Lightning Instrumentation System, Lightning Induced Voltage Instrumentation System, the Shuttle Modal Inspection System, O&M of Instrumentation systems (Ground Measuring System, Permanent Measuring System, Catenary Wire Lightning Instrumentation System, Shuttle Modal Inspection System, Metrological systems and Wave Analysis Data Processing Systems). Application Services: Includes software development for Maximo and Documentum and Sustaining Engineering for Ground Operations Legacy System.

The Shuttle Ground Operations is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 24: Shuttle Ground Operations Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)		Strategic Goal Supported: #1 Fly the Shuttle as safely as possible until its retirement, not later than 2010.
		Space Exploration & Innovation (#027)		
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[24] Shuttle Ground Operations information is available in NASA ProSight.

Table 25: 2007 Performance Results for Shuttle Ground Operations

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Processes and Activities	Quality	Complaints	Monthly average of 4 or less DRs across applications supports Program's overall reliability and ensures affordability of the systems.	Monthly average of 4 or less DRs across released LPS applications Standards of Excellence (SOE) = 4 or less Discrepancy Reports (DRs) Expectation = 5 to 7 DRs Maximum Error Rate (MER) = 8 DRs	Maintain SOE of 4 or less discrepancies (DRs) against LPS released applications each year from 2005 to 2010	3	Yes
Customer Results	Customer Benefit	Customer Satisfaction	End User Satisfaction through the measurement of number of CRs implemented to user's satisfaction.	100%	100%	100%	Yes
Customer Results	Timeliness and Responsiveness	Delivery Time	Annual percentage On-Time Delivery of LPS IT products supports Program's overall reliability and ensures affordability of the systems.	On-time Delivery of LPS IT Products - Standards of Excellence (SOE) = 95% Expectation = 80% Maximum Error Rate (MER) = >80%	Maintain SOE of 95% on-time delivery each year from 2005 to 2010	100%	Yes
Technology	Reliability and Availability	Availability	Monthly percentage of unplanned/unscheduled outage supports NASA goal of high system reliability and helps ensures space access.	Availability of systems: Standards of Excellence (SOE) = 99% Maximum Error Rate (MER) = >97%	Maintain 99% or better availability each year from 2005 to 2010	100%	Yes
Mission and Business Results	Transportation	Space Operations	Achieve 100% on-orbit mission success for all Shuttle missions. Mission success criteria are those provided to the prime contractor for contract performance fee determination.	100%	100%	100%	Yes

Shuttle Integrated Logistics[25]

The Integrated Logistics (IL) investment supports Shuttle Program launch activity by providing necessary hardware, software, and labor associated with logistics activity in ground processing and flight operations. The investment supports logistics needs for flight hardware articles as well as the need for program related training and ground support equipment. The IL organization supports NASA's strategies for future IT initiatives while complying with consolidated IT standards. It includes maintaining current Logistics systems and spares and providing repair support for the Operations Center for Shuttle Avionics Integration Laboratory (SAIL), Training Operations Center (TOC) and Integration and Program Requirements Multi-facility. It provides spares/repairs for IT hardware and software supporting NASA Shuttle Logistics Depot (NSLD) Special Test Equipment and CAD systems that support manufacturing and repair activities. It also supports current and future process improvements, including IT requirements for the migration of Logistics systems to PeopleSoft Inventory.

The Shuttle Integrated Logistics is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 26: Shuttle Integrated Logistics Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)		**Strategic Goal Supported: #1** Fly the Shuttle as safely as possible until its retirement, not later than 2010.
		Space Exploration & Innovation (#027)		
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[25] Shuttle Integrated Logistics information is available in NASA ProSight.

Table 27: 2007 Performance Results for Shuttle Integrated Logistics

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Processes and Activities	Quality	Complaints	Monthly average of 4 or less DRs across applications supports Program's overall reliability and ensures affordability of the systems	Monthly average of 4 or less DRs across released LPS applications Standards of Excellence (SOE) = 4 or less Discrepancy Reports (DRs) Expectation = 5 to 7 DRs Maximum Error Rate (MER) = 8 DRs	Maintain SOE of 4 or less discrepancies (DRs) against LPS released applications each year from 2005 to 2010	3	Yes
Customer Results	Timeliness and Responsiveness	Delivery Time	Annual percentage On-Time Delivery of IT products supports Program's overall reliability and ensures affordability of the systems	On-time Delivery of LPS IT Products - Standards of Excellence (SOE) = 95% Expectation = 80% Maximum Error Rate (MER) = >80%	Maintain SOE of 95% on-time delivery each year from 2005 to 2010	100%	Yes
Technology	Reliability and Availability	Availability	Monthly percentage of unplanned/unscheduled outage supports NASA goal of maintaining high system reliability and ensures space access	Availability of systems: Standards of Excellence (SOE) = 99% Maximum Error Rate (MER) = >97%	Maintain 99% or better availability each year from 2005 to 2010	100%	Yes
Mission and Business Results	Transportation	Space Operations	Fill rate of KSC Ground Items inventory - NASA goal of maintaining high system reliability and ensures space access	On-time Delivery of Items - Standards of Excellence (SOE) = 95% Expectation = 80%	Maintain 95% or better availability each year from 2007 to 2010	96.25% through June 2007	Yes
Mission and Business Results	Transportation	Space Operations	Fill rate of Orbiter items inventory	On-time Delivery of Items - Standards of Excellence (SOE) = 99% Expectation = 90%	Maintain 99% or better availability each year from 2007 to 2010	99.71% through June 2007	Yes
Mission and Business Results	Transportation	Space Operations	Achieve 100% on-orbit mission success for all Shuttle missions. Mission success criteria are those provided to the prime contractor for contract performance fee determination.	100%	100%	100%	Yes

Integrated Planning System

The Integrated Planning Systems (IPS)[26] provides the ground system computational capabilities which the Space Shuttle and the International Space Station (ISS) mission planners and flight controllers use for pre-mission planning, shuttle profile design and analysis including powered flight guidance and control software verification, post-mission analysis, and near real-time mission support. IPS provides a standard set of mission planning applications for producing the integrated mission activity timeline, and utilizes a central data management system to store and distribute products.

The Integrated Planning System is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 28: IPS Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)		**Strategic Goal Supported: #1** Fly the Shuttle as safely as possible until its retirement, not later than 2010.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	**Strategic Goal Supported: #2** Complete the International Space Station in a manner consistent with NASA's International Partner commitments and the needs of human exploration.

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[26] Integrated Planning System information is available in NASA ProSight.

Table 29: 2007 Performance Results for Integrated Planning System

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Technology	Reliability and Availability	Availability	Availability of ground system services for IPS critical and non-critical functions for all unscheduled outages and down time supports providing safe reliable system in ensuring space access.	Provide 98% availability of ground system services for IPS critical and non-critical functions for all unscheduled outages and down time.	Increase to and maintain availability at 100% through end of life 2016.	Continued to average 99.8% availability over the past 12 months (Apr 06-Mar 07).	Yes
Customer Results	Timeliness and Responsiveness	Delivery Time	Implement changes to the IPS baseline that are designated as Flight Priority 1 and return the system to an operational status within the period agreed to by the user (Operational Need Date/OND).	Meet the OND for all Flight Priority 1 service requests.	Maintain the current baseline through end of life 2016.	Currently performing at 100%. ONDs for all Flight Priority 1 service requests have been met from Jun '06 to May '07.	Yes
Processes and Activities	Quality	Errors	Software fault density measures software quality. Errors are reported via anomaly reports. Supports the strategic goal of enhancing efficiency in operations and sustaining of the IPS.	Achieve a software fault density of no more than 1 anomaly per thousand (.2) source lines of code (KSLOC) for mature software (greater than 2 years old).	Maintain the current baseline through end of life 2016.	Averaged .086 anomaly reports per KSLOC for the past 12 months (Jun '06-May '07	Yes
Mission and Business Results	Transportation	Space Operations	Provide ground system computational capabilities which the International Space Station and Space Shuttle mission planners and flight controllers use for pre-mission planning, shuttle profile design and analysis, and near real-time mission support.	Ensure the IPS provides the computational capabilities needed by the Shuttle and Station programs.	Maintain the current baseline through end of life 2016.	Currently performing at 100%. The IPS has not delayed nor negatively impacted a mission.	Yes

Shuttle Launch Control System

The Launch Control System (LCS)[27] investment maintains the unique hardware and software used at Kennedy Space Center to process and launch the Space Shuttle. The complex computer hardware and software provides control and monitors functionality as well as the capability to record and simultaneously playback near real-time telemetry. The system currently operates with 100 computer consoles using 12 million lines of custom source code. The LCS reliability is man-rated. The LCS consists of Shuttle Data Center (SDC), Checkout Control and Monitor Subsystem (CCMS) Operations, Record and Playback Subsystem (RPS), and Other Supporting Systems (Other O&M). The Shuttle Data Center provides storage and recall of all shuttle processing and launch data. The Record and Playback Subsystem (RPS) primary function is to record unprocessed Shuttle on-board instrumentation data during tests and launch countdowns.

The Shuttle Launch Control System is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 30: LCS Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)		**Strategic Goal Supported: #1** Fly the Shuttle as safely as possible until its retirement, not later than 2010.
		Space Exploration & Innovation (#027)		
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[27] Shuttle Launch Control System LCS information is available in NASA ProSight.

Table 31: 2007 Performance Results for Shuttle Launch Control System

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Processes and Activities	Quality	Complaints	Monthly average of 4 or less DRs across released LCS applications supports both the Programs overall reliability and ensures affordability of the systems	Monthly average of 4 or less DRs across released LCS applications Standards of Excellence (SOE) = 4 or less Discrepancy Reports (DRs) Expectation = 5 to 7 DRs Maximum Error Rate (MER) = 8 DRs	Maintain SOE of 4 or less discrepancies (DRs) against LCS released applications each year from 2005 to 2010	3	Yes
Customer Results	Customer Benefit	Customer Satisfaction	End User Satisfaction through the measurement of number of CRs implemented to user's satisfaction.	100%	100%	100%	Yes
Customer Results	Timeliness and Responsiveness	Delivery Time	Annual percentage On-Time Delivery of LCS IT products support both the Programs overall reliability and ensure affordability of the systems	On-time Delivery of LCS IT Products - Standards of Excellence (SOE) = 95% Expectation = 80% Maximum Error Rate (MER) = >80%	Maintain SOE of 95% on-time delivery Re-establish SOE of 95% on-time delivery each year from 2005 to 2010	100%	Yes
Technology	Reliability and Availability	Availability	Monthly percentage of unplanned or unscheduled outage supports the agency's goal of maintaining high LCS system reliability and helps ensures space access	Availability of systems: Standards of Excellence (SOE) = 99% Maximum Error Rate (MER) = >97%	Maintain 99% or better availability each year from 2005 to 2010	100%	Yes
Mission and Business Results	Transportation	Space Operations	Achieve 100% on-orbit mission success for all Shuttle missions launched in FY 2010. Mission success criteria are those provided to the prime contractor for contract performance fee determination	100%	100%	100%	Yes

Mission Control Center

The Mission Control Center (MCC)[28] is a world class spacecraft command and control facility able to support multiple spaceflight programs. The MCC provides flight operations and support for all of NASA's human space flight activities. It is also provides the primary means of controlling crewed spacecraft operated by NASA. Ground-based flight controllers observe the spacecraft systems through telemetry sent from the spacecraft to the ground. These same controllers are also responsible for managing the control elements of the spacecraft via ground-to-vehicle commands. The MCC communications network is responsible for all communication between the controllers on the ground, all communications with the crew, and command and control of all other support staff located at sites around the globe. The MCC itself is a web of subsystems, operating in concert to provide command and control functions that support the flight controllers.

The Mission Control Center is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 32: Mission Control Center Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)		**Strategic Goal Supported: #1** Fly the Shuttle as safely as possible until its retirement, not later than 2010.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	**Strategic Goal Supported: #2** Complete the International Space Station in a manner consistent with NASA's International Partner commitments and the needs of human exploration.

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[28] Mission Control Center information is available in NASA ProSight.

Table 33: 2007 Performance Results for Mission Control Center

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Technology	Reliability and Availability	Availability	Availability of ground system services for MCC critical and non-critical Shuttle and Station functions for all unscheduled outages and down time.	Provide 98% availability of non-critical functions for all unscheduled outages and down time.	Increase to and maintain availability at 100% through end of life 2016.	Continued to average 99.9% availability over the past 12 months (Apr 06-Mar 07)	Yes
Processes and Activities	Quality	Errors	Software fault density measures software quality. Errors are reported via anomaly reports. Supports the strategic goal of enhancing efficiency in operations and sustaining of the MCC.	Achieve a software fault density of no more than 1 anomaly per 5 thousand source lines of code (KSLOC) for mature software (greater than 2 years old) and 1 anomaly per 1 KSLOC for code less than 2 years old.	Maintain the current baseline through end of life.	Averaged .015 anomaly reports per KSLOC for the past 12 months (Jun '06 thru May '07)	Yes - Not level predicted
Customer Results	Timeliness and Responsiveness	Response Time	Implement changes to the MCC baseline designated as Flight Priority 1 and return the system to operational status within the period agreed to by the user (Operational Need Date/OND).	Meet the OND for all Flight Priority 1 service requests.	Maintain the current baseline through end of life.	Currently performing at 90%. 1 out of 10 service requests designated as Flight Priority 1 was not met during the period Jun '06 to May '07	Yes - Not level predicted
Mission and Business Results	Transportation	Space Operations	Provide command and control capabilities for safe mission operations of the International Space Station and Space Shuttle.	Ensure the MCC is able to provide command and control of Shuttle and Station activities without causing delays to the mission.	Maintain the current baseline through end of life.	Currently performing at 100%. The MCC has not caused a Shuttle launch or Station activity delay during the performance period.	Yes

ISS Payload Operations and Integration Center

The Payload Operations and Integration Center (POIC)[29], located within the Huntsville Operations Support Center (HOSC) at Marshall Space Flight Center, is the primary single NASA ground system responsible for integrated operational payload flight control and planning for the International Space Station (ISS) program. It supports the Science and Space Operations Mission Directorates. The POIC provides payload telemetry processing, command uplink, and planning capabilities for a large number of local Cadre flight controllers and remote ISS payload users and other facilities located throughout the world. The POIC integrates/controls ISS payload flight operations, simulation, and test preparation activities. ISS core systems and payload telemetry data is received, processed, stored, displayed, and distributed to local and remote payload users/controllers.

The POIC is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 34: POIC Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)	X	**Strategic Goal Supported: #2** Complete the International Space Station in a manner consistent with NASA's International Partner commitments and the needs of human exploration.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[29] Payload Operations and Integration Center information is available in NASA ProSight.

Table 35: 2007 Performance Results for ISS Payload Operations and Integration Center

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Customer Results	Service Quality	Accuracy of Service or Product Delivered	New user services & support capabilities	Payload Planning System (PPS) Build 7.	Implement Integrated Station LAN (ISL) upgrades to the DSRC application.	Delivered, Tested, and Certified PPS DSRC 7.0. Currently supporting ISS P/L Planning and Flight Operations. 100% compliance with new onboard architecture requirements.	Yes
Customer Results	Service Accessibility	Automation	Provide improved system automation, monitoring, and control	EHS Server Build 11.1 and EPC Desktop Build 5.1 Releases.	Implement automation, consolidation and other improvements within POIC System Architecture.	Delivered, Tested, and Certified EHS Build 11.1 and EPC Desktop Build 5.1. Currently supporting ISS P/L Flight Operations. Improved efficiency by 36%; reduced ops monitoring by 33%; system availability near 100%.	Yes
Customer Results	Service Accessibility	Service Availability	Provide Specified Critical Mission Services Availability for ISS Payloads/Science Users Support LOB	Provide Critical Services (Telemetry, Command, PIMS, Voice) Availability of at least 98%	Meet or Exceed Critical Services Availability Requirements.	Cumulative Scoring (Latest Report) for Services July '07: Telemetry (TLM) = 99.5% Command (CMD) = 99.97%, PIMS = 99.98%, Voice = 100.00%.	Yes
Technology	Efficiency	Technology Improvement	Innovation and Improvement	Payload Data Services System Build 4.3.1 Release.	Implement new compression and restoration features to prevent data loss.	Delivered, Tested, and Certified PDSS Build 4.3.1. Currently supporting ISS P/L Flight Operations. Reduced backup storage rqmts by 800%. Allows additional backup copy on low cost media for near zero data loss probability.	Yes
Customer Results	Customer Benefit	Customer Satisfaction	Improved Customer Satisfaction, Positive Customer Impacts & Improved Customer Training	Payload Planning System (PPS) Build 6.	Build, test, and certify PPS for clustering. Implement additional product service improvements requested by Cadre.	Delivered, Tested, and Certified PPS URC Build 6.2. Currently supporting ISS P/L Planning and Flight Operations. Improved customer efficiency by 50%; system availability near 100%.	Yes
Processes and Activities		Savings and Cost Avoidance	Cost Savings	POIC Baseline Operations and Maintenance Support	Perform Within Baseline Budget. Implement Potential Incremental improvements to save up to 5% additional cost.	Eliminated 4 hrs/wk preventive maintenance by implementing Dataguard. Backups automated and non-impacting to users. Server reductions result in $65K cost avoidance for refresh.	Yes
Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	Provide Specified Critical Mission Services Availability for ISS Payloads/Science Users Support LOB	Provide Critical Services (Telemetry, Command, PIMS, Voice) Availability of at least 98%	Meet or Exceed Critical Services Availability Requirements.	Cumulative Scoring (Latest Report) for Services July '07: Telemetry (TLM) = 99.5% Command (CMD) = 99.97%, PIMS = 99.98%, Voice = 100.00%.	Yes
Mission and Business Results	General Science and Innovation	Space Exploration and Innovation	Provide Specified Critical Mission Services Availability for ISS Payloads/Science Users Support LOB	Provide Critical Services (Telemetry, Command, PIMS, Voice) Availability of at least 98%	Meet or Exceed Critical Services Availability Requirements.	Cumulative Scoring (Latest Report) for Services July '07: Telemetry (TLM) = 99.5% Command (CMD) = 99.97%, PIMS = 99.98%, Voice = 100.00%.	Yes

Shuttle Processing Support[30]

Kennedy Space Center relies on converted Apollo infrastructure, facilities and equipment for Space Shuttle Processing. The Shuttle Processing Support (SPS) project supports business needs of the Space Shuttle Program (SSP) by mitigating risks of critical facilities and equipment with a current replacement value in excess of $3 Billion. Risk is mitigated by expending capital where necessary to fly the SSP safely. If not funded the SSP Process assumes additional risk against the APA, a likely 4-8 month manifest impact, and increased probability of launch delays/scrubs. As an example of the equipment impacted by this program, the existing Hydrogen Umbilical Mass Spectrometer (HUMS) Computer Command and Control system is over 10 years old and some of the VME cards are obsolete and no longer supported. The Launch Site Equipment (LSE) budget helps maintain this aged infrastructure.

The Shuttle Processing Support is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 36: Shuttle Processing Support Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)		**Strategic Goal Supported: #1** Fly the Shuttle as safely as possible until its retirement, not later than 2010.
		Space Exploration & Innovation (#027)		
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[30] Shuttle Processing Support information is available in NASA ProSight.

Table 37: 2007 Performance Results for Shuttle Processing Support

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Processes and Activities	Quality	Complaints	Monthly average of 4 or less DRs across released LPS applications supports both the Programs overall reliability and ensures affordability of the systems	Monthly average of 4 or less DRs across released LPS applications Standards of Excellence (SOE) = 4 or less Discrepancy Reports (DRs) Expectation = 5 to 7 DRs Maximum Error Rate (MER) = 8 DRs	Maintain SOE of 4 or less discrepancies (DRs) against LPS released applications each year from 2005 to 2010	3	Yes
Customer Results	Customer Benefit	Customer Satisfaction	End User Satisfaction through the measurement of number of CRs implemented to user's satisfaction.	100%	100%	100%	Yes
Customer Results	Timeliness and Responsiveness	Delivery Time	Annual percentage On-Time Delivery of LPS IT products support both the Programs overall reliability and ensure affordability of the systems	On-time Delivery of LPS IT Products - Standards of Excellence (SOE) = 95% Expectation = 80% Maximum Error Rate (MER) = >80%	Maintain SOE of 95% on-time delivery each year from 2005 to 2010	100%	Yes
Technology	Reliability and Availability	Availability	Monthly percentage of unplanned or unscheduled outage supports the agency's goal of maintaining high LPS system reliability and helps ensures space access	Availability of systems: Standards of Excellence (SOE) = 99% Maximum Error Rate (MER) = >97%	Maintain 99% or better availability each year from 2005 to 2010	100%	Yes
Mission and Business Results	Transportation	Space Operations	Achieve 100% on-orbit mission success for all Shuttle missions. Mission success criteria are those provided to the prime contractor (SPOC) for purposes of determining successful accomplishment of the performance fees in the contract	100%	100%	100%	Yes

ISS Software Development / Integration Laboratory

The Software Development and Integration Laboratory (SDIL)[31]/ Avionics is the Command and Data Handling (C&DH) subsystem utilizing the onboard computer and network capabilities of the International Space Station (ISS). It also includes the ground support and test functions for the associated ground operations and sustaining engineering. It encompasses Hardware/Software Integration (HSI), Perform ISS HSI, design integration, command and telemetry verification, and stage software verification, flight support including C&DH MER console support and mission flight following, Guidance, Navigation & Control (GN&C), and more.

The Software Development/Integration Laboratory is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 38: SDIL Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)		**Strategic Goal Supported: #2** Complete the International Space Station in a manner consistent with NASA's International Partner commitments and the needs of human exploration.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[31] Software Development Integration Laboratory information is available in NASA ProSight.

Table 39: 2007 Performance Results for ISS Software Development/Integration Laboratory

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Technology	Reliability and Availability	Availability	Availability of 95% of the SDIL servers providing the ISS with latest Flight Avionics software which increases safety and reliability to ISS on orbit operations. Goal 8 and Goal 9	99%	Maintain a minimum of 95% availability for servers in the SDIL	97.50%	Yes
Customer Results	Timeliness and Responsiveness	Delivery Time	Software Products delivered on-time based on Avionics and software schedules on the original calendar plan (block release basis), decoupling them from launch dates Goal 8 and Goal 9	100%	Maintain 100% Baseline	100%	Yes
Processes and Activities	Quality	Errors	New ISS Software Defects Found On-Orbit per On-Orbit KSLOC Goal 8 and Goal 9	5	Target less than 5.0 defects	0.022	Yes
Mission and Business Results	Transportation	Space Operations	Mission Critical Space Station Software Anomalies/ Software Deficits. Goal 8, Objective 8.4 Assure capabilities for world-class research on a laboratory in low Earth orbit.	0	Maintain baseline	0	Yes

Space Shuttle Program Flight Software[32]

The Space Shuttle Program Flight Software investment provides for maintenance, testing, reconfiguration, and configuration management of the onboard Shuttle software. The SSP FSW IT investment allows NASA and its collaborating industry partner to provide the products and services required to support the Space Shuttle operations. The products and services include network management, systems management, engineering tasks, customer support help desk, desktop management, IT Security operations management, and COTS software installation. It also includes the design, testing, and operational deployment of customized hardware and software. FSW is a custom-built, unique environment, not COTS. No E-gov projects or e-business technologies are applicable to this highly unique, non-COTS, non-public investment.

The Space Shuttle Program Flight Software is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 40: Space Shuttle Program Flight Software Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)		**Strategic Goal Supported: #1** Fly the Shuttle as safely as possible until its retirement, not later than 2010.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[32] Space Shuttle Program Flight Software information is available in NASA ProSight.

Table 41: 2007 Performance Results for Space Shuttle Program Flight Software

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Customer Results	Timeliness and Responsiveness	Delivery Time	Multifunction Electronic Display Subsystem (MEDS) Software Interim Release Deliverables. The delta code changes for the interim release are 100% technically correct and delivered on schedule with 100% accuracy for associated documentation.	100% accuracy and On Schedule Delivery	Maintain 100% accuracy and on time delivery.	Year-to-date 100%	Yes
Processes and Activities	Quality	Errors	Flight Software Avionics and Software System Support: Provide I-Load Selections 100% Accurate. No errors requiring redelivery which impacts I-Load development schedules or requiring patch for flight.	100% accuracy.	Maintain 100%	Year-to-date 100%	Yes
Processes and Activities	Quality	Errors	Vehicle and Payload Data Collection/Reconfiguration : 100% Error Free. No errors that impact safety, mission success, or major program schedule milestones.	99.50%	Maintain 99.5%	Year-to-98.9%	Yes - Not level predicted
Processes and Activities	Quality	Errors	Backup Flight System (BFS) Flight Software Software Approval Sheet (SAS) and test patches are 100% technically accurate, complete in content, and delivered on the negotiated schedule.	100% accuracy.	Maintain 100%	Year-to-date 100%	Yes
Mission and Business Results	Transportation	Space Operations	Flight Software Avionics and Software System Support with no impact to safety, mission success or major program schedule milestones.	100% accuracy and On Schedule Delivery	Maintain 100% accuracy and on time delivery.	Year-to-date 100%	Yes
Technology	Reliability and Availability	Availability	Shuttle Avionics Integration Laboratory (SAIL) operations system availability = 100%. SAIL operations system non-availability with no impact to safety, mission success, or major program schedule milestones to be no more than 5%.	98.40%	Maintain baseline	Year-to-date 97.7%	Yes - Not level predicted

Space Shuttle Program Integration[33]

Space Shuttle Program Integration (SSP PI) performs complete end-to-end Space Shuttle Operations including the orbiter vehicle hardware. It includes payload integration into the Space Shuttle, systems integration of the flight hardware elements through all phases of flight, and configuration management of program hardware, software, and requirements. Technologies used include the Baseline Accounting and Reporting System, Mission Requirements Control System, Automated Scheduling and Planning, Automated Mission & Payload Tracking System, Shuttle Drawing System, Program Compliance Assurance and Status System, Shuttle Integration Accounting Status System, Verification Information System, Work Authorizing Documentation System, Waivers/Exceptions, Operations and Maintenance Requirements and Specifications Change Processing, Document Configuration Management System, Technical Document Management System 2, Shuttle Payload Integration and Cargo Evaluation System, Critical Math Model Database, Launch Management System. .

The Space Shuttle Program Integration is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 42: SSP PI Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)		**Strategic Goal Supported: #1** Fly the Shuttle as safely as possible until its retirement, not later than 2010.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[33] Space Shuttle Program Integration information is available in NASA ProSight.

Table 43: 2007 Performance Results for Space Shuttle Program Integration

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Customer Results	Customer Benefit	Customer Satisfaction	End User Satisfaction through the measurement of number of CRs implemented to user's satisfaction.	Maintain Standards of Excellence (SOE) of 100% user satisfaction for implementation of CRs.	Obtain 100% end user satisfaction.	100% YTD	Yes
Customer Results	Timeliness and Responsiveness	Delivery Time	Annual percentage On-Time Delivery of PI Technical Information Systems IT products support both the Programs overall reliability and ensure affordability of the systems	On-time Delivery of PI Technical Information Systems IT Products - Standards of Excellence (SOE) = 95% Expectation = 80% Maximum Error Rate (MER) = >80%	Re-establish SOE of 95% on-time delivery each year from 2005 to 2011	95.35 % YTD	Yes
Processes and Activities	Quality	Errors	Monthly average of 4 or less DRs across released PI applications supports both the Programs overall reliability and ensures affordability of the systems.	Monthly average of 4 or less DRs across released PI applications Standards of Excellence (SOE) = 4 or less Discrepancy Reports (DRs) Expectation = 5 to 7 DRs Maximum Error Rate (MER) = 8 DRs	Maintain SOE of 4 or less discrepancies (DRs) against Program Integration (PI) released applications each year from 2006 to 2011	0 DR's per month YTD	Yes
Mission and Business Results	Transportation	Space Operations	Monthly percentage of unplanned or unscheduled outage supports the agency's goal of maintaining high system availability with no impact to safety, mission success or major program schedule milestones.	Availability of systems: Standards of Excellence (SOE) = 99% Maximum Error Rate (MER) = >97%	Maintain 99% or better availability each year from 2006 to 2011	99.99% YTD	Yes
Technology	Reliability and Availability	Availability	Monthly percentage of unplanned or unscheduled outage supports the agency's goal of maintaining high system reliability and helps ensures space access	Availability of systems: Standards of Excellence (SOE) = 99% Maximum Error Rate (MER) = >97%	Maintain 99% or better availability each year from 2006 to 2011	99.99% YTD	Yes
Technology	Information and Data	Data Reliability and Quality	Accuracy of computer resource projections through the accuracy of CPU hour, DASD, and tape useage projections for total SSPO.	Maintain accuracy of resource projections of = > 85%	Maintain 85% or better	95.35% Year-to-Date Average	Yes

Space Station Production Facility[34]

The International Space Station (ISS) Production Facility (IPF), separated into Development, Integration, and Production environments, provides tools for developing and maintaining the engineering analysis for the ISS Program; for managing of program manifests and on-orbit inventory; and for accessing and maintaining critical Program data (including Station physical properties, drawings) required for NASA, Boeing and other Program Participants to meet their Program commitments. The investment has significant assets involved in the management and storage of data as well as the maintenance of program unique applications.

The Space Station Production Facility is a steady-state operations investment under the NASA IT Capital Planning Investment Control Process. Major milestones include operational support, maintenance, and incremental development.

Table 44: ISS IPF Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)		**Strategic Goal Supported: #2** Complete the International Space Station in a manner consistent with NASA's International Partner commitments and the needs of human exploration.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

[34] Space Station Production Facility information is available in NASA ProSight.

Table 45: 2007 Performance Results for ISS Production Facility

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Technology	Efficiency	System Response Time	Application Support Requests provide ISS users with IT services such as IT security, network performance, customer support, and software bug fixes which affect the performance of the ISS program to ensure safe and reliable space access.	Closeout 85% of all open Application Service Requests as identified by contract requirements	Maintain or Exceed Baseline of 85%	91.26%	Yes
Customer Results	Customer Benefit	Customer Satisfaction	Customer Satisfaction Survey is sent out every time the Technical Support Team completes an ASR or other request. Responses are reviewed and processes adjusted if required.	Maintain 95% customer satisfaction rating of very good or excellent	95% or more customer satisfaction rating of very good or excellent	98.22%	Yes
Processes and Activities	Quality	Errors	Percentage of planned vs. actual IT DRDs, project plans, proposals, process documents, or major software or hardware deliveries	Deliver 100% of all planned deliveries on time (CUM average)	Maintain or Exceed Baseline of 100% of on-time deliveries	102.86%	Yes
Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	Percent availability of the servers to provide ISS users with latest applications such as VMDB, MIDAS, and PRACA which increase safety and reliability to ISS operations.	Server availability of 99.25% as identified by contract requirements	Maintain a minimum of 99.25% availability of the Production, Integration, and Development, and Engineering Servers within the ISS Production Facility	99.98%	Yes

NASA Integrated Services Network[35]

The NASA Integrated Services Network (NISN) provides high-quality, reliable, cost-effective telecommunications systems and services for mission control, science data handling, and program administration for NASA programs. NISN provides wide area network services to support administrative applications, such as email, general Internet connectivity, and access to web-based applications. NISN services are used to connect control centers, NASA Centers, contractors, and principal investigators for the Space Shuttle, International Space Station, and Space Network Programs. NISN services are deployed to multiple locations within Russia and other international locations to facilitate collaboration with NASA's international space partners. NISN services are used to connect NASA centers, ground stations, and data facilities for the transfer of and access to earth science data and information resources. NISN also supports the NASA Ground Network, NASA's Deep Space Network and 40 space science missions dedicated to the exploration of the solar system and the universe.

Table 46: NISN Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)	X	**Strategic Goal Supported: #3** Develop a balanced overall program of science, exploration, and aeronautics consistent with the redirection of the human spaceflight program to focus on exploration.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

Table 47: Performance Results for NISN

Fiscal Year	Measurement Area	Measurement Grouping	Measurement Indicator	Baseline	Target	Actual Results	Target Met
2006	Mission and Business Results	Information Management	Influence user behavior in order to reduce voice teleconferencing¬ cancellation costs to less than or equal to 3% of total voice teleconferencing¬ costs	None	Goal is 3%	User training includes information regarding cancellation policy and cost. Individual users are contacted when they neglect to cancel conferences. Performance to date varies from 1% to 3%.	Yes
2007	Mission and Business Results	Information Management	Influence user behavior in order to reduce voice teleconferencing¬ cancellation costs to less than or equal to 3% of total voice teleconferencing¬ costs	None	3%	2.81% as 8/2/2007	Yes
2007	Customer Results	Availability	WANR: Technical Benefits: Availability 99.7% to 99.999%	99.70%	100.00%	99.997% as of 8/2/2007	Yes

[35] NASA Integrated Services Network information is available in NASA ProSight.

Fiscal Year	Measurement Area	Measurement Grouping	Measurement Indicator	Baseline	Target	Actual Results	Target Met
2007	Technology	Response Time	% of time that moves, adds, and changes are performed in accordance with published implementation intervals or in accordance with mutually agreed upon schedules	None	99%	100% as of 8/2/2007	Yes
2007	Customer Results	Accuracy of Service or Product Delivered	% of time that actual costs for each service request are no greater than 10% of the original estimate regardless of number of requests.	95%	95%	98.4% as of 8/2/2007	Yes
2007	Customer Results	Availability	% of time that services outages are restored in accordance with published service levels	None	99.50%	100% as of 8/2/2007	Yes
2007	Processes and Activities	Security	% of time that security incidents will be responded to within 2 hours	None	Goal is 99%	99.79% as of 8/2/2007	Yes
2007	Technology	Availability	WANR: Technical Benefits: PIP-SIP interconnections expand for 100Mbps to 1000Mbps	100 Mbps	1000Mbps	2 of 3 sites complete as of 8/2/2007	Yes - Late
2007	Technology	User Requirements	Provide capacity for 32,313M	3,176M	32,313M	32,342M	Yes
2007	Technology	Response Time	% of time that services are provided in accordance with performance specifications as documented in the NISN Services Document or in accordance with mutually agreed upon performance specifications	None	Goal is 98%	97.4% as of 8/2/2007	Yes
2008	Mission and Business Results	Information Management	Influence user behavior in order to reduce voice teleconferencing¬ cancellation costs to less than or equal to 3% of total voice teleconferencing¬ costs	None	3%	TBD	

Mandatory Standards

In September 2007, the NASA Chief Engineer distributed a list of mandatory technical standards to be instituted for all current and future NASA space flight programs and projects (http://standards.nasa.gov). These are included in this Transition Strategy to elevate their visibility and ensure all activities related to spacecraft, launch vehicles, instruments developed for space flight programs and projects, research and technology developments funded by and to be incorporated into space flight programs and projects, critical technical facilities specifically developed or significantly modified for space flight systems, and ground systems that are in direct support of space flight operations.

While these mandatory standards primarily affect investment activities within SOMD, they are to be applied agency-wide. All mission directorate activities related to the above space flight functions are required to follow these standards.

Discipline	Standard	Title	Application	Citation
Electrical	NASA-STD-4003	Electrical Bonding For NASA Launch Vehicles, Spacecraft, Payloads, And Flight Equipment	All NASA human rated and robotic missions	
Electrical	NASA-STD-4005	Low Earth Orbit Spacecraft Charging Design Standard	All NASA human rated and robotic missions	• Does not apply to payloads and hardware for atmospheric or sub-orbital flights, including sounding rockets, balloons, and aircraft (either manned or unmanned) launch systems. • Does not apply to Class D programs/payloads.
Electrical	AIAA S-111-2005	Qualification and Quality Requirements for Space Solar Cells	All NASA human rated and robotic missions	• Not to include non-space based applications and atmospheric flight vehicles at flight levels below 100K ft either manned or unmanned.
Electrical	AIAA S-112-2005	Qualification and Quality Requirements for Space Solar Panels	All NASA human rated and robotic missions	

Discipline	Standard	Title	Application	Citation
Electrical	MIL-STD-461	Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment	All NASA human rated and robotic missions	
Human Factors	NASA-STD-3000 Volume I	Man-Systems Integration Standards	All NASA human rated missions	
Human Factors	NASA-STD-3000 Volume II	Man-Systems Integration Standards	All NASA human rated missions	
M&P	NASA-STD-5006	General Fusion Welding Requirements For Aerospace Materials Used In Flight Hardware	All NASA human rated and robotic missions	• All deviations, exceptions, and waivers from the requirements contained in NASA-STD-5006 shall be approved via a Materials Usage Agreement (MUA). An MUA is a formal document, approved by the Responsible Materials and Processes Authority, showing that a non-compliant material is acceptable for the specific application identified. The Responsible Materials and Processes Authority is the designated individual, panel, or group at the NASA Center or sponsoring institution responsible for materials and processes control, which has the authority to interpret materials and processes requirements.

Discipline	Standard	Title	Application	Citation
M&P	NASA-STD-6001	Flammability, Odor, Off gassing And Compatibility Requirements & Test Procedures for Materials In Environments that Support Combustion (Superseding NHB-8060.1C)	All NASA human rated missions	• All deviations, exceptions, and waivers from the requirements contained in NASA-STD-6001 shall be approved via a Materials Usage Agreement (MUA). An MUA is a formal document, approved by the Responsible Materials and Processes Authority, showing that a non-compliant material is acceptable for the specific application identified. The Responsible Materials and Processes Authority is the designated individual, panel, or group at the NASA Center or sponsoring institution responsible for materials and processes control, which has the authority to interpret materials and processes requirements.
M&P	NAS410	National Aerospace Standard Certification and Qualification of Nondestructive Test Personnel	All NASA human rated and robotic missions	• Does not apply to individuals who only have administrative authority over the personnel identified above, nor does it apply to research personnel developing technology for subsequent approval by a certified Level 3. • All deviations, exceptions, and waivers from the requirements contained in NAS 410 shall be approved via a Materials Usage Agreement (MUA). An MUA is a formal document, approved by the Responsible Materials and Processes Authority, showing that a non-compliant material is acceptable for the specific application identified. The Responsible Materials and Processes Authority is the designated individual, panel, or group at the NASA Center or sponsoring institution responsible for materials and processes control, which has the authority to interpret materials and processes requirements.
Structures/ MEQ	NASA-STD-5001	Structural Design and Test Factors of Safety for Spaceflight Hardware	All NASA human rated and robotic missions	

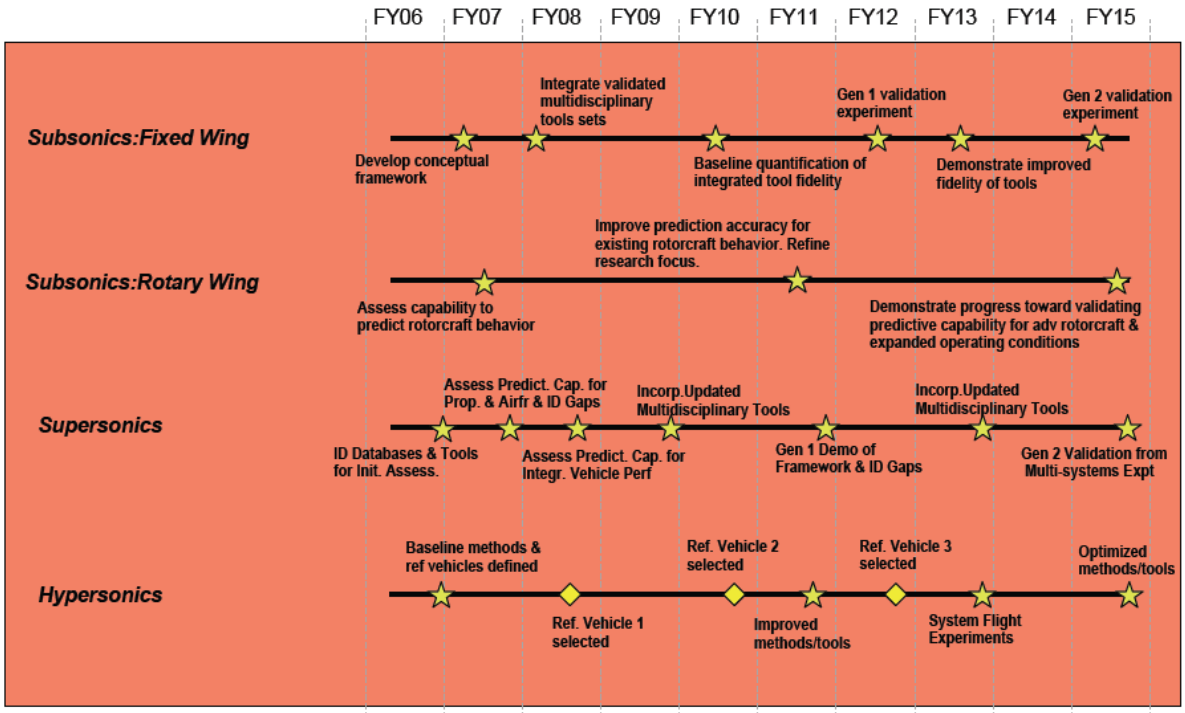
Discipline	Standard	Title	Application	Citation
Structures/ MEQ	NASA-STD-5002	Load Analyses Of Spacecraft And Payloads	All NASA human rated and robotic missions	• Does not apply to payloads and hardware for atmospheric or sub-orbital flights, including sounding rockets, balloons, and aircraft (either manned or unmanned) launch systems. • Does not apply to Class D programs/payloads.
Structures/ MEQ	NASA-STD-5017	Design and Development Requirements for Mechanisms	All NASA human rated and robotic missions	• Specifically does not address human factors requirements. Does not exempt a mechanism from any safety, fault tolerance, or hazard control requirements.
Structures/ MEQ	AIAA S-080-1998	Space Systems, Metallic Pressure Vessels, Pressurized Structures, and Pressure Components	All NASA human rated and robotic missions	
Structures/ MEQ	AIAA S-081A-2006	Standard for Space Systems — Composite Overwrapped Pressure Vessels (COPVs)	All NASA human rated and robotic missions	
Operations	AFSPCMAN 91-710	Range Safety User Requirements Manual	All NASA human rated and robotic missions	• Applies to all activities from or onto Air Force Space Command ranges, including the Western Range at Vandenberg Air Force Base, California, and the Eastern Range at Patrick Air Force Base, Florida. • Does not apply to launches from Wallops Flight Facility in Virginia.
Program Control	NASA-STD-6002	Applying Data Matrix Identification Symbols on Aerospace Parts	All NASA human rated and robotic missions	

Discipline	Standard	Title	Application	Citation
Test & Verification	NASA-STD-7001	Payload Vibroacoustic Test Criteria	All NASA human rated and robotic missions	• Does not apply to launch vehicles, payloads launched by sounding rockets, aircraft and balloons, and ground support equipment. • Does not apply to Class D programs/payloads.
Test & Verification	NASA-STD-7002	Payload Test Requirements	All NASA human rated and robotic missions	• Does not apply to Class D programs/payloads.
Test & Verification	NASA-STD-7003	Pyroshock Test Criteria	All NASA human rated and robotic missions	• Not to include pyroshock testing of non-space rated vehicles, payloads and transport systems designed for atmospheric flight below 200 k ft including sounding rockets, balloons, and aircraft (either manned or unmanned) launch systems.

Aeronautics Research Mission Directorate

NASA's Aeronautics Research Mission Directorate (ARMD) conducts high-quality, cutting-edge research that generates innovative concepts, tools, and technologies to enable revolutionary advances in our Nation's future aircraft as well as in the airspace in which they will fly. ARMD programs will facilitate a safer, more environmentally friendly, and more efficient national air transportation system. In addition, NASA's aeronautics research will continue to play a vital role in supporting NASA's human and robotic space exploration activities.[36]

Fundamental Aeronautics Top-Level Roadmap



Mission Support Service Segment

The Mission Support Segment Architecture comprises a series of Baseline Architectures, Target Architectures, and Transition Strategies for cross-cutting segments of the NASA enterprise. They describe the common or shared services that support NASA's core mission areas and business services, and they are driven by business management to deliver products that improve the delivery of services and solutions to the Agency. The Mission Support segment aggregates individual enterprise service segments (e.g., CIO, CFO, Procurement) into one combined segment.

NASA's investment in Enterprise IT is managed under the OCIO's "NASA Integrated Information Infrastructure Program" (NIIIP). Consistent with the Infrastructure Optimization Initiative (IOI), this program focuses on taking what NASA has in place,

[36] *FY2009 Budget Estimates*

built and managed separately by individual Centers over several decades, and molding those systems into an integrated infrastructure aligned to mission and business needs to create a cohesive strategy of integration, automation, and virtualization. Using the NASA Enterprise Architecture as the framework, the Target state aggregates demand and provisioning by consolidating where appropriate, shared services across the enterprise, and aggregate buying services where appropriate at the Center or Agency level.

The Mission Support Service Segment is a living architecture. It requires maintenance and monitoring to assimilate new business and information requirements. These drivers update segment architecture work products, helping to maintain clear relationships between agency strategic goals, business and information management solutions, and measurable performance improvements. For example, top-down drivers are reflected through changes to the agency EA and new cross-agency initiatives. Bottom-up change drivers typically reflect new requirements identified through implementation projects and the development of business and information management solutions.

The Mission Support Service Segment includes NASA's Enterprise Services. Enterprise Services are Common or shared IT services supporting core mission areas and business services. Enterprise services are defined by the agency service model and include the applications and service components used to achieve the purpose of the agency (e.g., knowledge management, records management, mapping/GIS, business intelligence, and reporting).[37]

The Mission Support Segment includes the following Executive Offices, Mission Support Offices, Executive Functions and Centers' & Components' Facilities Mission Support:

- Administrator's Office
- Office of Safety and Mission Assurance (S & MA)
- Office of Program Analysis and Evaluation (PA & E)
- Office of the Chief Financial Officer (OCFO)
- Office of the Chief Information Officer (OCIO)
- Office of the Chief Engineer
- Office of the General Counsel

Figure 13: Mission Support Segment

[37] FEA Practice Guidance November 2007 page 2-12.

- Strategic Communications
- Office of External Relations
- Office of the Inspector General
- Office of the Chief Health and Medical Officer (OCHMO)
- Office of Institutions and Management (I & M)
- Centers and Mission Support Facilities

The Mission and responsibilities of each of the Mission Support offices is detailed in the Mission Support Segment Architecture document. As the Enterprise Architectures for each of the slices of the Mission Support Segment are completed they will be further detailed as well.

The Investments within the Mission Support Segment are aligned with the various Offices within the segment as depicted below:

Table 48: Mission Support Investment Offices

Investment	Mission Support Office
NASA Data Center	Mission Support Facilities
NASA Integrated Enterprise Management – Aircraft Management Module	BY 09 - Office of the Chief Financial Officer BY10 moving to Office of the Chief Information Officer
NASA Integrated Enterprise Management – Core Financial	BY 09 - Office of the Chief Financial Officer BY10 moving to Office of the Chief Information Officer
NASA Integrated Enterprise Management - Human Capital Information Environment	BY 09 - Office of the Chief Financial Officer BY10 moving to Office of the Chief Information Officer
NASA Integrated Enterprise Management — Integrated Asset Management – Property, Plant & Equipment (IAM_PP&E)	BY 09 - Office of the Chief Financial Officer BY10 moving to Office of the Chief Information Officer
NASA Office Automation, IT Infrastructure, and Telecommunications	Office of the Chief Information Officer NASA's ongoing infrastructure and new improvement initiatives.
NASA Integrated Services Network	BY09 – Space Operations Segment BY10 moving to Office of the Chief Information Officer

NASA has program-specific IT that spans Centers; and institutional IT that crosses programs; but NASA needs enterprise IT that serves both.

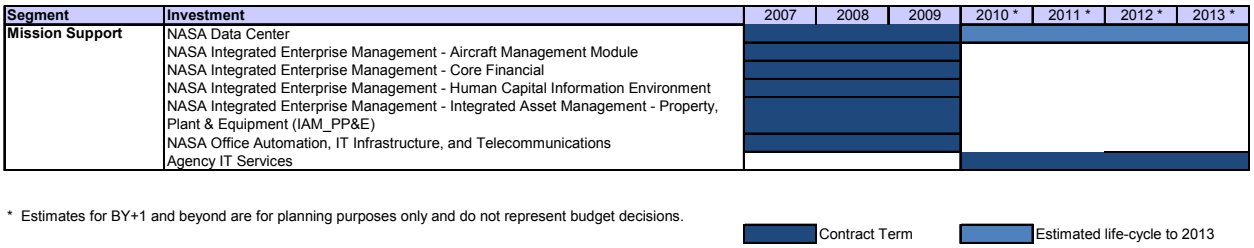
To support the new IT strategy a Program, "Agency IT Services," will be established under a new theme called Agency Management and Operations. As part of the FY10 PRG process, funding for the execution of the new IT strategy will be realigned to the

AITS budget line. This represents a significant structure change from the FY09 President's Budget submission.

Initially, funding that supported NASA Integrated Services Network (NISN), Integrated Enterprise Management (IEM), and the OCIO budget will be redirected to the AITS budget line item. Additionally, through the PPBE process, Centers, Mission Support Offices (MSO) and Mission Directorates (MD) Programs / Projects will provide IT budget requirements which will be used to identify opportunities for SMC consideration and budget re-alignment to the AITS. The NASA Integrated Services Network (NISN) investment will move from the Space Operations Segment to the Mission Support Segment in BY10.

The Major IT investments in the Mission Support Service Segment are shown below:

Figure 14: Mission Support Sequence Plan



NASA's IT Investments have been aligned with the agency's strategic goals. Table 47 below is also presented in Appendix 1 of the *Information Resources Management (IRM) Strategic Plan, September 2007*.

Table 49: Mission Support Major IT Investment Strategic Goal Alignment[38]

Investment	Investment Description	Strategic Goal Alignment
NASA Data Center	The NASA Data Center provides computing infrastructure support services across NASA as a Mission Support activity.	2006 NASA Strategic Plan – Supports all goals, sub-goals, and cross-cutting management strategies.
NASA Integrated Enterprise Management – Aircraft Management Module	The Aircraft Management Module (AMM) will establish an integrated aircraft operations and business management capability at all NASA centers with aircraft operations	2006 NASA Strategic Plan – Cross-Cutting Management Strategies: Integrated Financial Management.
NASA Integrated Enterprise	The Core Financial and Contract Management Module will serve as	2006 NASA Strategic Plan – Cross-Cutting

[38] *Information Resources Management (IRM) Strategic Plan, September 2007*

Investment	Investment Description	Strategic Goal Alignment
Management – Core Financial	NASA's Financial Accounting System and Contract Management System respectively. Core Financial will ensure that NASA meets President's Management Agenda scorecard standards while CMM improves accuracy and currency of acquisition data.	Management Strategies: Integrated Financial Management.
NASA Integrated Enterprise Management - Human Capital Information Environment	The Human Capital Information Environment Project is a key initiative in improving NASA's HR Capabilities. It is an integrated Agency-wide approach to Human Capital management with one authoritative data repository for Human Capital information.	2006 NASA Strategic Plan – Cross-Cutting Management Strategies: Strategic Management of Human Capital.
NASA Integrated Enterprise Management — Integrated Asset Management – Property, Plant & Equipment (IAM_PP&E)	IAM provides an integrated system for the management of NASA's PP&E to increase financial accountability, reduce costs (through increased equipment reuse), and prepare for Agency asset disposal challenges.	2006 NASA Strategic Plan – Cross-Cutting Management Strategies: Strategic Management of Capital Assets.
NASA Office Automation, IT Infrastructure, and Telecommunications	NASA's investment in Office Automation, IT Infrastructure, and Telecommunications is managed as the NASA Integrated Information Infrastructure Program. NASA OAIT incorporates NASA's ongoing infrastructure and new improvement initiatives.	2006 NASA Strategic Plan – Supports all goals, sub-goals, and cross-cutting management strategies.
NASA Integrated Services Network	NASA Integrated Services Network (NISN) provides WAN services, which directly support the Space Operations, Science, and Aeronautics Mission Directorates, and all NASA Centers and facilities, Agency institutional activities, and many projects and missions.	2006 NASA Strategic Plan – Supports all goals, sub-goals and cross-cutting management strategies.

NASA Data Center

The NASA Data Center provides operations and technical support for computing requirements. It represents the consolidation of several center data centers distributed across the NASA Centers to provide a centralized, cost effective environment for providing both Mission and Mission Support IT computing capabilities. The data center provides services to all 10 NASA centers, three of the four Mission Directorates, and five of the Mission Support Organizations (MSO's). The initial mainframe consolidation resulted in significant savings to the agency. This initial success lead to the further consolidation of all 10 centers institutional mainframe operations and the closure of the Slidell Computing Complex supporting Shuttle Main Tank manufacturing. In 2004, non-mainframe CIO agency-wide systems were included and the NASA ADP Consolidation Center was renamed NASA Data Center expanding services beyond the mainframe. The NDC Enterprise Architecture documented the AS-IS framework aligning the Services with the business requirements.

The following is the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

Table 50: NASA Data Center Investment Performance

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Customer Results	Service Accessibility	Service Availability	% of time that services outages are restored in accordance with published service levels	99.90%	Goal GT 99.5%	Performance targets in the Transition Strategy have been fully achieved, on schedule. As currently measured in contract deliverables, this metric was met at a value of 100%.	Yes
Technology	Quality Assurance	Standards Compliance and Deviations	% of hosted applications with approved Security Plans	100%	100%	Performance targets in the Transition Strategy have been fully achieved, on schedule. 100% of hosted systems have approved security plans.	Yes
Technology	Efficiency	Load levels	Mainframe Service Demand Is Tracked by the CPU, DASD & Tape.	100%	100%	Performance targets in the Transition Strategy have been fully achieved, on schedule. These services are tracked and continually adjusted to meet the customer requirements. Billing of services in support of the mainframe has been updated to include these parameters.	Yes
Customer Results	Customer Benefit	Customer Satisfaction	Improved customer satisfaction in each service cluster, including: Accuracy of service or product delivered, delivery time, and service coverage	Determined by results of FY06 customer satisfaction survey	Goal is 98% or higher	Performance targets in the Transition Strategy have been fully achieved, on schedule. As currently measured in contract deliverables, the metric performance was set at 98.21%. Continued efforts to establish other measurements of customer satisfaction of service are planned.	Yes
Mission and Business Results	Information and Technology Management	IT Infrastructure Maintenance	Establish Service Level Agreements with customers for all services hosted at the NASA Data Center	50 % of hosted services have approved SLA's in place	65% of hosted services to have signed SLA's	Performance targets in the Transition Strategy have been fully achieved, on schedule. Based on the CIO Scorecard, NDC has two SLAs and that they are at 100%. As part of an overall review of service level management for the NDC– the EA has been aligned with the Service Delivery model. An OLA (previously an SLA document) has been prepared which standardizes the service provided across all organizations. SLAs will only be established for those unique services outside the standardized OLA agreement. Hosted and housed systems will fall under this OLA. The model is falling more in line with ITIL and industry standards.	Yes
Mission and Business Results	Information and Technology Management	IT Infrastructure Maintenance	Provide IT operations and maintenance support for mainframe, midrange, infrastructure (SAN, Active Directory, etc.) and application development services in support of NASA's mission.	Increase service customer density from previous years baseline	Increase by 2%	Performance targets in the Transition Strategy have been fully achieved, on schedule. Increase in service customer density from previous year's baseline increased more than 2% due to hardware maintenance workload increase, additional applications assumed, and additional midrange server responsibility assumed. There is an active Service Delivery approach to broaden the customer base in support of both Marshall and Agency Centers. The NDC is being fully integrated into the NASA Competency Model as a service provider to this expanded customer base.	Yes

NASA Integrated Enterprise Management – Aircraft Management Module[39]

The Aircraft Management Module (AMM) will establish an integrated aircraft operations and business management capability at all NASA centers with aircraft operations, facilitate access to real-time or near real time data vital to the safety of aircraft and to records of currency for personnel regularly charged with custodianship of essential NASA aircraft, provide the system platform for standardized single source authoritative data and report formatting, Web-based access and computer-based interoperable system components for aircrew and ground crew qualifications and currency, aircraft parts inventory/procurement, aircraft maintenance and configuration management and financial management and enable improved and consistent reporting of program and service operations via traceable compliance with NASA & FAA regulations.

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

Table 51: 2007 Performance Results for NASA Integrated Enterprise Management - Aircraft Management Module

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Technology	Reliability and Availability	Availability	NAMIS shall provide for smooth transition to paper and back to electronic processing in the event of system interruption.	100 hours in data uploading / convergence	50% Decline	Not yet measured	TBD
Processes and Activities	Productivity	Productivity	Time required to update all aircrew currency for each center.	50 hours	50% Decline	4 hours	Yes
Mission and Business Results	Controls and Oversight	Program Monitoring	Number of flights that have flown that included aircrew that was not operationally current.	10 flights	99% Decline	0 Flights	Yes
Customer Results	Timeliness and Responsiveness	Response Time	Labor hours required to update all aircrew currency at each center.	50 hours	50% Decline	4 hours	Yes

[39] NASA Integrated Enterprise Management – Aircraft Management Module information is available in NASA ProSight.

NASA Integrated Enterprise Management - Core Financial

Since 2003, the Core Financial (CF) system has served as NASA's financial accounting system of record and is its financial management "backbone," providing NASA's core accounting functionality. In fiscal year (FY) 2003, NASA migrated from 10 disparate legacy financial systems to 1 core accounting system. CF has been structured to ensure that NASA makes measurable and demonstrable progress toward achieving: the PMA Scorecard standards for success in Improved Financial Performance, compliance with FMFIA and FFMIA, an unqualified financial audit opinion, and alignment with the Financial Management Line of Business. The investment consists of 4 major components, which comprise NASA's comprehensive strategy and action plan for financial management modernization and improvement. This investment is designed and planned to support improvements to the three central areas that affect financial performance: business processes, technology (systems/software), and reporting/data. The Contract Management Module supports NASA's Cross-Cutting Management Strategies, specifically Strategic Management of Information and Information Technologies and Strategic Financial Management. These strategies are part of NASA's efforts to comply with statutory requirements in the Clinger-Cohen Act and the Government Performance and Results Act of 1993. The Management Strategies also support President Management Agenda (PMA) Government-wide items such as Financial Performance and Expanded eGovernment. 90% of NASA's budget is obligated via contracts. GAO audits have cited NASA's contracting system as a "high risk" performance gap. Also, NASA's legacy procurement systems support and automate only a fraction of the procurement staff's required tasks. This fragmented environment consists of 26 information systems that support contract management across the Centers, with 5 systems that support the overall enterprise procurement environment and each Center has its own procedures for managing procurements. CMM replaced these systems in Novemer 2006 and led to the standardization of Agency policies and procedures, resulting in improved NASA contracting capabilities. The investment will be fully integrated with NASA's core accounting and financial management system.

The following is the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

Table 52: 2007 Performance Results for NASA Integrated Enterprise Management - Core Financial - (Part 1)

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Mission and Business Results	Financial Management	Accounting	A measure of interest penalties paid on late invoices	1,193 payments - $67,000	Continue to provide information to support the amount of interest penalties paid on all invoices that are subject to the Prompt Payment Act within 2 business days after the period closes	497 payments - $35,841	Yes
Mission and Business Results	Financial Management	Accounting	A measure for reconciliation [Prepaid, Budgetary, to Proprietary (AP), Budgetary to Proprietary (Cost), unexpended to expended appropriation, funded expenses, reimbursable advances, reimbursable revenue, reimbursable receivables (Property)	Prepaid's:-$8.8k; Budgetary to Proprietary (AP)-$2.1M; Budgetary to Proprietary (Cost)-$5.6K; Unexpended to Expended Appropriation-$9.8K; Funded Expenses-$6.3M; Reimbursable Revenue-$73K Reimbursable Receivables-$1.3M;	The Account Relationship reconciliation's, defined in Volume 19 of the Financial Management Regulations (FMR) 'Periodic Monitoring Control Activities,' will decrease in dollar amount by 50% per Center	Reimbursable Advances-$1.5M; Anticipated Reimbursements- $584.4K; Budget to Proprietary (Cost)- $8.7M; Unexpended to Expended Appropriation- $0; Funded Expenses- $3.2M; Prepaids-$148K; Property- $292M; Budgetary to Proprietary (AP)-$269K; Reimbursable Receivables-$1.9M; Reimbursable Revenue-$461K; Canceled Proprietary Accounts-$27M	Yes - Not level predicted
Customer Results	Customer Benefit	Customer Satisfaction	Increase in the percentage of procurement staff and procurement system users satisfied with NASA procurement systems (in %)	FY07 baseline data will be used and will be available on 8/1/07 3.2	Increase in procurement staff and procurement system users satisfied by 5% over baseline	Baseline set from FY07 data..Actual in FY08	Yes
Customer Results	Customer Benefit	Customer Satisfaction	Average customer service rating with data integrity within the end user group for Core Financial	3	Maintain an average rating of 4.0 higher on a 5 point scale	3.3	Yes - Not level predicted
Customer Results	Customer Benefit	Customer Satisfaction	Average customer satisfaction rating with ease of access within the end user group for Core Financial	3.6	Maintain an average rating of 4.0 or higher on a 5 point scale	3.5	Yes - Not level predicted

Table 53: 2007 Performance Results for NASA Integrated Enterprise Management - Core Financial - (Part 2)

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Customer Results	Customer Benefit	Customer Satisfaction	Average customer satisfaction rating with data availability within the end user group for business warehouse (BW)	3.2	Maintain an average of 4.0 point or higher on a 5 point scale	3.7	Yes - Not level predicted
Customer Results	Customer Benefit	Customer Satisfaction	Average customer satisfaction rating on the reliance theme for the Competency Center's support of the Centers within the Leaders and Enablers survey groups	3.4	Maintain an average of 4.0 or higher on a 5 point scale	4.1	Yes
Technology	Reliability and Availability	Availability	Average level of Compusearch system availability (uptime) is maintained at or above 95%	The system is not yet operational and thus no baseline data is available	To increase Compusearch uptime at 99.8% availability	99%	Yes
Technology	Reliability and Availability	Availability	System hardware availability	97.99%	Maintain a 99.8 availability	99.40%	Yes - Not level predicted
Technology	Reliability and Availability	Availability	System availability for users (including user lockout)	97.47	Maintain a 99.8 availability	94.60%	Yes - Not level predicted
Technology	Reliability and Availability	Availability	In any one month period 95% of "Severity 1' problems resolved within 4 hours	100%	Maintain a 95% resolution rate	N/A (No Severity 1 CMM SRs in 2007)	Yes
Technology	Reliability and Availability	Availability	In any oen month period, 90% of 'Severity 2' problems resolved within 8 primary business hours	100%	Maintain a 90% resolution rate	100% closed within 8 primary business hours	Yes
Processes and Activities	Productivity	Efficiency	Decrease in the number of hours required to reconcile data for external agency reporting (in hours)	1.61 hours per week per person	Decrease average hours per week to 33% compared to baseline	1.61	Yes - Not level predicted

Table 54: 2007 Performance Results for NASA Integrated Enterprise Management - Core Financial - (Part 3)

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Processes and Activities	Productivity	Efficiency	Timeliness of funds distribution process (time from receipt of apportionment to distribution of funds to Center)	65 Days	The NASA internal process for funds distribution will continue to be equal to or less than 12 days	24 hours to 12 days depending on projects within that Mission	Yes
Processes and Activities	Productivity	Efficiency	Number year end closing (steps/time to perform)	120 steps/4.5 day (60)	The number of system steps which will enable system year end processes will continue to be completed in 5 days	103 steps/3 days (51 hours)	Yes
Processes and Activities	Productivity	Efficiency	Budget distribution number of steps to perform	45 steps for appropriated funds	Continue to reduce the number of duplicate steps executed between SAP and Central Resources Control System-1 (CRCS-1) by 80%	5 steps in the distribution process	Yes
Mission and Business Results	Administrative Management	Help Desk Services	Maintain average resolution time for procurement systems help desk (HD) tickets at less than 24 hours (in hours)	Baseline average for help desk resolution is 21 hours	Decrease average resolution by 5% from baseline	17.3 hours	Yes

NASA Integrated Enterprise Management — Integrated Asset Management – Property, Plant & Equipment (IAM_PP&E)

The Integrated Asset Management-Property, Plant and Equipment (IAM/PP&E) project supports NASA's Cross-Cutting Management Strategies, specifically: The Integrated Financial Management, Strategic Management of Information and Information Technologies, Strategic Management of Capital Assets, Strategic Planning and Performance Management Systems. In turn, these strategies comply with statutory requirements in the Clinger-Cohen Act and the Government Performance and Results Act. IAM/PP&E aligns with the President's Management Agenda items: Budget and Performance Integration, Improved Financial Performance, and Expanded E-Government. The IAM/PP&E Investment addresses performance gaps from past audits related to asset management. The two overarching deficient conditions are the lack of integration between current logistics and financial systems and the lack of sufficient internal control policies and procedures as they relate to NASA equipment. Adequate electronic control over Agency-Wide assets provides best practices accounting of taxpayer funding for existing property, disseminating real-time asset data to decision makers that allocate resources to ongoing projects and future requirements. The objectives of this Investment are: To integrate processes between PP&E functional and PP&E financial work elements; improve system operability; and improving PP&E financial and functional management. The scope of asset items includes theme assets, capital assets, and other accountable property that is NASA-owned / NASA-held or

NASA-owned contractor-held (GFE). Duplicative systems replaced: NASA Equipment Management System (NEMS) and NASA Property Disposal Management System (NPDMS). Measurable benefits of this investment are: (1) more accurate, timely valuation of PP&E; (2) improved valuation, capitalization, and depreciation processes; (3) improved audit trail of capitalized PP&E; (4) standardization of NASA-held and Contractor-held property management processes; (5) elimination of manual processes; (6) and reduced operational costs. "Go live" for this investment is scheduled for April of FY 2008 and benefits realization will be phased over that fiscal year, and FY 2009 - ROI realized. The FY 2008 budget will fund the stabilization of the system and cover part of the first year of the system's full operational capability. A Risk Management Framework (3/6/2007) and Updated Project Plan (5/17/2007) are in place.

The following is the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

Table 55: Integrated Asset Management Investment Performance

Fiscal Year	Measurement Area	Measurement Grouping	Measurement Indicator	Baseline	Target	Actual Results	Target Met
2008	Mission and Business Results	Management Improvement	Capture all accountable personal property held by NASA into the Agency's ERP system	0% of accountable personal property held by NASA in the Agency's ERP system.	50% of accountable personal property held by NASA in the Agency's ERP system.	TBD	
2008	Mission and Business Results	Reporting and Information	Decrease number of material weaknesses on latest annual audited Agency financial statement	One material weakness in the latest audit report for non-capital PP&E.	No material weaknesses for non-capital PP&E.	TBD	
2008	Customer Results	Access	Provide visibility of accountable personal property in the Agency to all users	0% of users with access to the IAM System.	50% of users with access to the IAM System.	TBD	
2008	Customer Results	Access	Obtain user acceptance of web-based tool for management of assigned accountable personal property	0% of users that are satisfied with the legacy system.	50% of users that are satisfied with the new system.	TBD	
2008	Processes and Activities	Innovation and Improvement	Provide a web-based property management tool to all users of accountable personal property held by NASA	0% of users that perform work via web.	50% of users that perform work via the web.	TBD	
2008	Processes and Activities	Cycle Time	Reduction of manual financial processes currently used to valuate NASA owned accountable property	0% of assets capitalized and depreciated automatically in the ERP System.	50% of assets capitalized and depreciated automatically in the ERP System.	TBD	

Fiscal Year	Measurement Area	Measurement Grouping	Measurement Indicator	Baseline	Target	Actual Results	Target Met
2008	Technology	Improvement	Provide capability to perform inventory campaigns via e-mail.	0 Inventory campaigns conducted via e-mail.	10 Inventory campaigns conducted via e-mail.	TBD	
2008	Technology	Internal Data Sharing	Integration of PP&E functional and financial management	0 Legacy Systems fully Integrated with new IAM System.	2 Legacy Systems fully Integrated with new IAM System.	TBD	

NASA Office Automation, IT Infrastructure, and Telecommunications

NASA's investment in Office Automation, IT Infrastructure, and Telecommunications is managed as the NASA Integrated Information Infrastructure Program (NIIIP). Consistent with the Infrastructure Optimization Initiative (IOI),this program focuses on taking what NASA has in place, built and managed separately by individual Centers over several decades, and molding those systems into an integrated infrastructure aligned to mission and business needs to create a cohesive strategy of integration, automation, and virtualization. Using the NASA Enterprise Architecture as the framework, the NASA Integrated Information Infrastructure Program's Concept of Operation is to aggregate demand and provision by consolidating where appropriate, share services across the NASA Centers, and provide aggregate buying services where appropriate at the Center or Agency level. NASA has identified initiatives to further utilize best practices relative to standardization, E-government, service level management between providers and customers, and others described below. This effort is in concert with the President's Vision of Space Exploration and with the realities of budgetary challenges at the Agency and Center levels. NASA supports the IOI's Program Performance Measurement Office (PPMO) in developing service level metrics for measuring cost efficiency and service levels for the IT infrastructure commodity services. The NIIIP is the NASA strategy for managing the transformation of the Agency's IT infrastructure from a collection of 11 loosely connected architectures and multiple site-dependent systems to a single, secure enterprise architecture providing Agency wide IT infrastructure services (One NASA environment). This "One" NASA IT environment is designed to support NASA's Strategic Plan, IOI, and the President's expanding E-Government initiative. Specific One NASA services will be provided through a combination of the following coordinated approaches, appropriately selected to best deliver an efficient and effective infrastructure: - Centrally managed and provisioned - Centrally managed and locally provisioned - Locally managed and provisioned.

The following is the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

Table 56: OAIT Investment Performance

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Customer Results	Customer Benefit	Customer Satisfaction	Improved customer satisfaction in each service cluster, including: Accuracy of service or product delivered, delivery time, and service coverage	Determined by results of FY06 customer satisfaction survey	10% improvement to baseline for all areas falling below 75%	10% improvement based on customer survey attained	Yes
Processes and Activities	Management and Innovation	Innovation and Improvement	Percentage of agency workforce with access to Agency-wide calendaring and messaging	TBD based on FY06 outcome	75%	75%	Yes
Technology	Quality Assurance	Standards Compliance and Deviations	Percentage of investments aligned with NASA EA "to be" state	FY06 investments	100% of new investments	100% of new investments	Yes
Technology	Quality Assurance	Standards Compliance and Deviations	Percentage of projects compliant with current NPR 7120.5	FY06 projects	100% of new projects	100% of new investments	Yes
Mission and Business Results	Controls and Oversight	Program Evaluation	Frequency of Program Reviews	Yearly	Maintain annual reviews	Annual Reviews Accomplished	Yes
Processes and Activities	Security and Privacy	Security	Number of applications using account management system	Number of applications transitioned as of FY06	25 additional applications transitioned	25 additional applications transitioned	Yes
Processes and Activities	Security and Privacy	Security	Level of compliance with Agency Network Security Model	Level of compliance at end of FY06	25% compliance with Agency Network Security Perimeter model	25% compliance with Agency Network Security Perimeter model	Yes
Processes and Activities	Cycle Time and Timeliness	Timeliness	Timeliness in meeting milestones for corrective actions	Baseline established by current FISMA report	95% of milestones met for corrective actions	95% of milestones met for corrective actions	Yes

NASA Integrated Enterprise Management – Human Capital Information Environment
The Human Capital Information Environment (HCIE) is a key initiative in improving NASA's current human resources capabilities by developing an integrated, strategic and Agency-wide approach to human capital management. HCIE will eliminate redundant systems, consolidate current applications, and integrate the remaining HC processes and systems. This will provide the Agency with one authoritative data source (ADS) for HC information and allow data integration other NASA applications and E-Gov initiatives. Through HCIE, NASA employees will be able to access a consistent source of HC data, allowing the workforce to make better and more timely decisions using dependable information. Through the implementation of continuous planning and change management, reengineered business processes, and effective use of technology, HCIE will produce the expected mission-support improvements. This investment was previously a part of the Science Segment. Beginning in BY10, this investment is included in the Mission Support Segment.

Table 57: OAIT Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)	X	**Strategic Goal Supported: #3** Develop a balanced overall program of science, exploration, and aeronautics consistent with the redirection of the human spaceflight program to focus on exploration.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

The following is an excerpt of the performance information pertaining to this major IT investment reported in the corresponding Exhibit 300.

Table 58: 2007 Performance Results for NASA Integrated Enterprise Management - HCIE

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Customer Results	Service Accessibility	Access	% of employees who use the HR portal	0	5%	<1%	Yes - Not level predicted
Technology	Reliability and Availability	Availability	% of training courses reliability (% of uptime)	N/A	50%	TBD	TBD
Processes and Activities	Productivity	Efficiency	# of individual center processes re-engineered into a single Agency process	5 activities x 10 center processes = 50 processes	2% reduction	TBD	TBD
Mission and Business Results	Information and Technology Management	System Development	# of centers who have implemented the workforce services portal	0	10	10	Yes

SOMD - NASA Integrated Services Network[40]

The NASA Integrated Services Network (NISN) provides high-quality, reliable, cost-effective telecommunications systems and services for mission control, science data handling, and program administration for NASA programs. NISN provides wide area network services to support administrative applications, such as email, general Internet connectivity, and access to web-based applications. NISN services are used to connect control centers, NASA Centers, contractors, and principal investigators for the Space Shuttle, International Space Station, and Space Network Programs. NISN services are deployed to multiple locations within Russia and other international locations to facilitate collaboration with NASA's international space partners. NISN services are used to connect NASA centers, ground stations, and data facilities for the transfer of and access to earth science data and information resources. NISN also supports the NASA Ground Network, NASA's Deep Space Network and 40 space science missions dedicated to the exploration of the solar system and the universe. This investment was previously a part of the Space Operations Segment. Beginning in BY10, this investment is included in the Mission Support Segment.

40 **From SOMD - NASA Integrated Services Network.doc**

Table 59: NISN Business Reference Model (BRM) and Strategic Goal Alignment

Service for Citizens (#1)	General Science & Innovation (109)	Scientific & Technological Research & Innovation (#026)	X	**Strategic Goal Supported: #3** Develop a balanced overall program of science, exploration, and aeronautics consistent with the redirection of the human spaceflight program to focus on exploration.
		Space Exploration & Innovation (#027)	X	
	Transportation (118)	Space Operations (#063)	X	

Table 60: 2007 Performance Results for NASA Integrated Services Network

Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Planned Improvement to the Baseline	Actual Results	Target Met
Customer Results	Service Quality	Accuracy of Service or Product Delivered	% of time that actual costs for each service request are no greater than 10% of the original estimate regardless of number of requests.	95%	95%	98.4% as of 8/2/2007	Yes
Customer Results	Service Accessibility	Service Availability	WANR: Technical Benefits: Availability 99.7% to 99.999%	99.70%	100.00%	99.997% as of 8/2/2007	Yes
Customer Results	Service Accessibility	Service Availability	% of time that services outages are restored in accordance with published service levels	None	99.50%	100% as of 8/2/2007	Yes
Technology	Reliability and Availability	Availability	WANR: Technical Benefits: PIP-SIP interconnections expand for 100Mbps to 1000Mbps	100 Mbps	1000Mbps	2 of 3 sites complete as of 8/2/2007	Yes - Late
Mission and Business Results	Information and Technology Management	Information Management	Influence user behavior in order to reduce voice teleconferencing cancellation costs to less than or equal to 3% of total voice teleconferencing costs	None	3%	2.81% as 8/2/2007	Yes
Technology	Efficiency	System Response Time	% of time that moves, adds, and changes are performed in accordance with published implementation intervals or in accordance with mutually agreed upon schedules	None	99%	100% as of 8/2/2007	Yes
Technology	Efficiency	System Response Time	% of time that services are provided in accordance with performance specifications as documented in the NISN Services Document or in accordance with mutually agreed upon performance specifications	None	Goal is 98%	97.4% as of 8/2/2007	Yes
Technology	Effectiveness	User Requirements	Provide capacity for 32,313M	3,176M	32,313M	32,342M	Yes
Processes and Activities	Security and Privacy	Security	% of time that security incidents will be responded to within 2 hours	None	Goal is 99%	99.79% as of 8/2/2007	Yes

Transition Strategy

NASA's investment in Enterprise IT is managed under the NASA Integrated Information Infrastructure Program (NIIIP). Consistent with the Infrastructure Optimization Initiative (IOI), this program focuses on taking what NASA has in place, built and managed separately by individual Centers over several decades, and molding those systems into an integrated infrastructure aligned to mission and business needs to create a cohesive strategy of integration, automation, and virtualization. Using the NASA Enterprise Architecture as the framework, the Target is to aggregate demand and provisioning by consolidating where appropriate, share services across the enterprise, and provide aggregate buying services where appropriate at the Center or Agency level. NASA has identified initiatives to further utilize best practices relative to standardization, E-government, service level management between providers and customers, and others described below.

Infrastructure Projects

The OCIO's strategy for infrastructure enhancements is illustrated in Figure 15: Infrastructure Integration Transition Strategy.

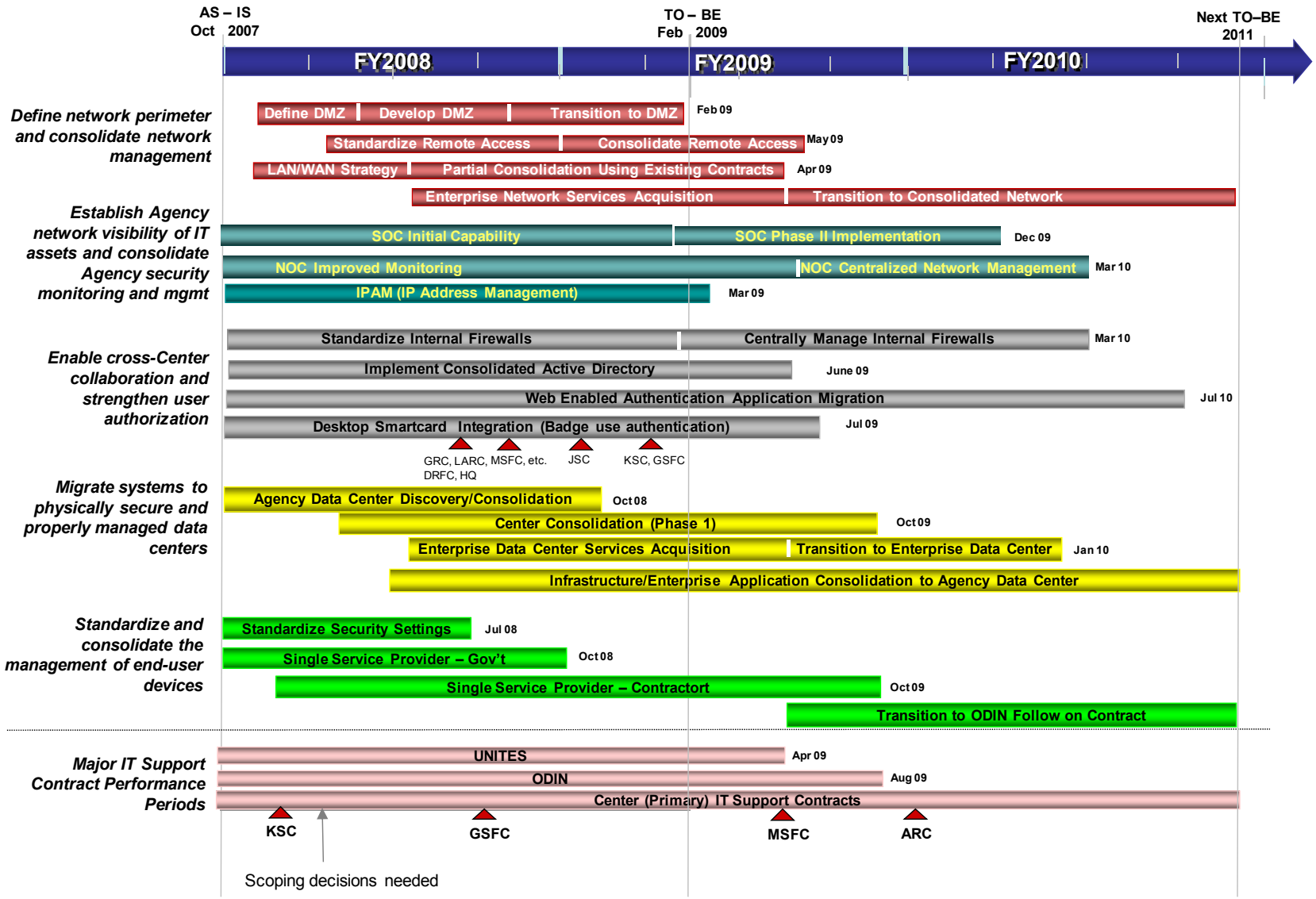
Focus Area: Define network perimeter and consolidate network management, including:

- DMZ **–** Establish the policy and architecture for implementation, install hardware and connectivity, reconfigure firewalls, and transition services to DMZ;
- Standardize and Consolidate Remote Access – Establish consistent, NASA-wide method for external network access (standardize) and then transition single service (consolidate); and
- Consolidate LAN/WAN Management **–** Establish strategy for budgeting, acquisition, and operations model for network services. Begin implementation using existing contracts (ODIN, UNITeS) and complete with follow-on competition.

Focus Area: Establish Agency network visibility of IT assets and consolidate Agency security monitoring and management, including:

- SOC – Consolidate incident monitoring and response via single Security Operations Center (SOC). As part of Phase II, add capability such as intrusion prevention and forensic analysis.
- NOC – Implement centralized monitoring of WAN/LAN activity and status via single Network Operations Center (NOC). Upgrade to perform WAN/LAN use, analysis, and configuration control
- IPAM - Implement a centralized IP address management capability and comply with Federal mandates

Figure 15: Infrastructure Integration Transition Strategy



Focus Area: Enable cross-Center collaboration and strengthen user authorization, including:

- Standardize and Consolidate Firewalls – Establish NASA-wide standards and configuration for internal firewalls (standardize) and then transition to centralized management.
- Consolidated Active Directory - Centralize Active Directory Management for "enterprise" authentication to applications
- Web-Enabled Authentication - Implement 2-factor authentication for applications leveraging the Identity management infrastructure
- Desktop – Smartcard Integration - Update the desktop environment to take advantage of smart badge technologies

Focus Area: Migrate systems to physically secure and properly managed data centers, including:

- Agency Data Center Discovery – Agency Data Center services model discovery
- Consolidate Data Centers – Phase I integrates Center data centers. Phase II implements an enterprise set of data centers.
- Enterprise Application Consolidation - Migrate Agency applications to Agency managed Data Center services model

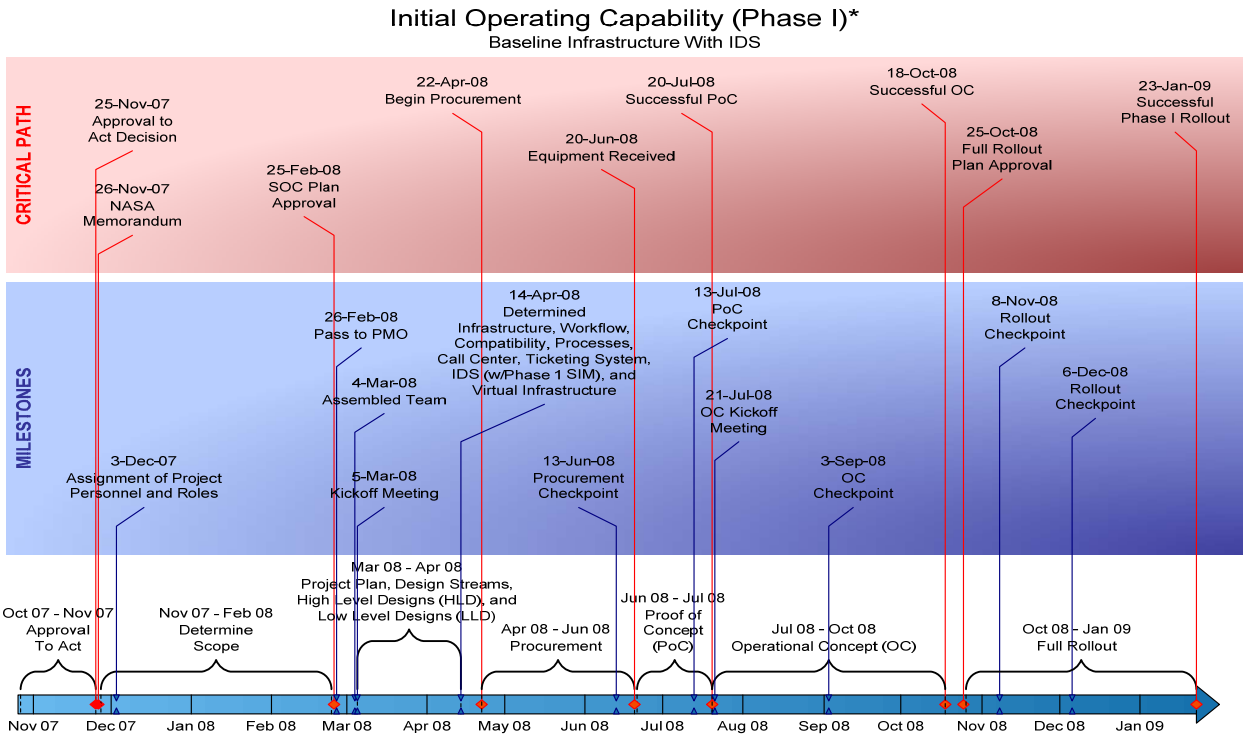
Focus Area: Standardize and consolidate the management of end-user devices, including

- Single Service Provider for Government – Transition government employees to ODIN
- Single Service Provider for Contractors – Transition appropriate contractor personnel to ODIN
- Standardize Security Configuration – Implement OMB mandated Federal Desktop Core Configuration (FDCC) security settings on all end user devices

Security Operations Center (SOC)

Success for this investment will depend on clear Agency policy that mandates the SOC as the central, integrated security monitoring and reporting capability and authorizes SOC visibility to all NASA networks and IT systems. Figure 16 illustrates the Transition Strategy.

Figure 16: Security Operations Center Phase 1 Transition Strategy



* Subsequent phases to add additional SOC operation capabilities (SIM, Portal, Conent Monitoring, etc) will occur post Jan 09.

The SOC's capabilities will include one Agency IT Security incident hotline; one Agency incident management database; standardized Intrusion Detection System (IDS) allowing for wide scale rule distribution and consistent alerting; 24x7 IDS management, monitoring and response; coordinated IDS sensor placement inside Center firewalls to provide Agency visibility; and an initial Security Information Management (SIM) implementation that correlates information from security devices and presents alerts and issues.

Agency-wide IT Services

Previously, Agency-Wide IT Services provided a limited set of services. Agency-wide IT Services provided a convenient method for funding services that had broad agency implications. Funding was transferred from Center Management and Operations (CM&O) to the OCIO Corporate G&A. This entire budget was placed on the Agency-wide IT Services project, WBS 217633 and will now be transferred to the AITS. However, neither Corporate G&A nor the Program Direct budget was transferred and currently are still collected from the individual customer.

NASA Integrated Services Network (NISN)

With the FY09 budget, the NISN resources ill be fully transferred to the OCIO. The highest priority for NISN is continued excellence in customer support. If budget reductions are realized, circuits and operations always take precedence. Assumptions regarding project funding are as follows:

- All circuit costs are assumed fully funded.
- All direct costs for MSFC and GSFC are fully funded. Civil servant levels are 14 FTEs at GSFC and 13 FTEs at MSFC.
- Funding for the Mission Operations Voice Enhancement (MOVE) contract will be provided incrementally as options are exercised. Funding for the base period of the contract has been reflected in the guidelines for GSFC.
- Both GSFC and MSFC are to assume three (3) weeks of forward funding to go from FY 09 into FY 10. This includes continuation of all circuit connectivity. The Centers shall keep in mind the need for forward funding when determining the spend plan for FY 09 (ensuring that sufficient funds are rolled through).

Planning for procurement activities relating to the completion of the *Unified NASA Information Technology Services* (UNITeS) contract should also be underway at that time. The Program Executive guidance states that there shall be a single contract for NISN-related work. The Program Executive for NISN should be involved in determining the procurement approach and should be kept apprised of the status of the development of the Statement of Work for the procurement. The Program Executive shall be kept apprised of the status of proposal evaluation and contractor selection.

Over-guide requests are anticipated for items A and B identified below. Additional over-guides may be accepted after consultation with the Program Executive.

- Additional bandwidth for the corporate network to accommodate the anticipated needs of such customers as the Columbia Supercomputer and the Constellation Program.
- Additional bandwidth for the mission network to accommodate the anticipated needs of such customers as LRO and Constellation.

As the Space Shuttle program ends, the inventory of NISN-provided circuits and other services will change. The project will compile an inventory of assets that provide Space Shuttle program-only services and identify target dates for the disposal of those assets. A detailed plan for NISN Space Shuttle asset management will be delivered to the Program Executive by December 31, 2008.

NASA Data Center

The NASA Data Center (NDC) provides centrally managed computing services for the Agency including Mainframe and Midrange Computing Services, and numerous other services. Services are negotiated in advance using descriptive units and pre-determined rates. The services for FY 2008 have been negotiated. The budget requirements for FY 2010, with adjustments to FY 2009 are the subject of this Budget Guidance. The Fiscal Years 2011 through 2014 shall be considered budgetary estimates for planning purposes. This funding is in support of those negotiated and planned services.

In FY06, PDM 25 moved the Center Institutional costs from CM&O to the Agency-wide IT Services project within the Corporate G&A budget. Center Institutional costs are no longer included in this guidance. However, in preparation for the BY 2010 PPBE and development of service rates, the NDC has negotiated service requirements with all customers. Each Center has been made aware of the Center-requested services and the associated costs of those services.

The following table reflects the projected budget requirements for the Corporate G&A and Program Direct customers for the PPBE BY2010 budget horizon. Demand for services beyond those provided by the customer to develop the provisional rates that generated these budget estimates will be billed as a part of the NDC Service Request System.

NASA Data Center Agency-wide IT Services Customer Funded							
Corporate G&A	**Service**	**FY2009**	**FY2010**	**FY2011**	**FY2012**	**FY2013**	**FY2014**
OCFO	Data Center	$2,980	$3,044	$3,244	$3,305	$3,422	$3,560
OCIO	Data Center	$1,306,760	$613,380	$641,366	$607,087	$644,049	$704,175
OHC	Data Center	$2,125	$2,168	$2,252	$2,323	$2,344	$2,410
Procurement	Data Center	$49,088	$50,084	$52,013	$53,649	$54,137	$55,655
OSPP	Data Center	$264,347	$268,725	$280,456	$289,373	$297,378	$271,528
NSSC	Data Center	$122,130	$9,969	$10,016	$10,960	$11,303	$12,116
	Subtotal	**$1,747,431**	**$947,371**	**$989,348**	**$966,696**	**$1,012,634**	**$1,049,443**
Program Direct	**Service**	**FY2009**	**FY2010**	**FY2011**	**FY2012**	**FY2013**	**FY2014**
ESMD	Data Center	$459,874	$472,523	$494,029	$506,797	$518,804	$531,021
IEMP	Data Center	$1,651,490	$1,694,585	$1,773,873	$1,823,360	$1,859,261	$1,923,068
JSC-Shuttle	Data Center	$1,561,104	$1,695,638	$1,465,624	$0	$0	$0
MSFC-ET	Data Center	$3,738,892	$4,228,791	$0	$0	$0	$0
SOMD	Data Center	$2,143	$2,189	$2,331	$2,375	$2,459	$2,558
Threat Line for Shuttle	Data Center	$0	$0	$4,367,421	$6,603,736	$6,820,398	$7,210,457
	Subtotal	**$7,413,503**	**$8,093,727**	**$8,103,278**	**$8,936,268**	**$9,200,922**	**$9,667,104**
Total		**$9,160,934**	**$9,041,097**	**$9,092,626**	**$9,902,964**	**$10,213,556**	**$10,716,547**

IT Certification and Accreditation (C&A)

The IT C&A process, mandated under Federal Information Security Management Act (FISMA), requires all NASA IT systems to operate under an up-to-date System Security Plan (SSP) and a current Authority to Operate (ATO). To meet the C&A requirements, each system must have:

- A documented FIPS-199 security risk categorization of Low, Moderate or High
- A current SSP, including risk assessment
- Certification of the system, which includes a review of the IT security controls of the system
- An accreditation decision by the system's Authorizing Official (either ATO or Interim ATO)

FISMA is required of all systems, to include contractor systems that store, process or transmit NASA data. To this end, contractor operated systems are required to undergo certification and accreditation. Procurement Notice 04-25, released on June 19, 2007, stipulates the contractual requirements for IT security under NASA Far Supplement (NFS) 1852.204-76. Communication of this requirement must be made to all

contractors and partners who store, process or transmit NASA data. Cost impacts of this requirement must be included in budget requests.

Following initial certification, the C&A process has to be repeated every three years or when there is a significant change to the system. This is in addition to normal maintenance of the required system security documentation and performing annual IT security self-assessments.

(Note: 'Significant change' is defined in NIST Special Publication (SP) 800-37, Guide for the Security Certification and Accreditation of Federal Information Systems. The C&A process is described in detail in NIST SP 800-37 and other NIST SPs, FIPS-199, NPR 2810.1A, NASA SOPs ITS-SOP-0030 and ITS-SOP-0031on C&A, ITS-SOP-0005B, and in several presentations to the NASA CIO and IT security community.)

During the FY07 timeframe, certification costs for High and Moderate were funded by the OCIO. The re-certification of systems included in the initial count of High and Medium systems that completed certification in FY07 is currently to be covered within Agency-wide IT Services. In FY06, PDM 25 moved the Center Institutional costs from CMO to the Agency-wide IT Services project within the Corporate G&A budget. Center Institutional costs will no longer be included in this guidance.

Beginning in FY08 and all years forward, all C&A costs for newly established systems must be funded by the system owner and included in the Investment budget request for that IT investment.

The following table reflects the annualized budget requirements for the Corporate G&A and Program Direct customers for the PPBE BY2010 budget horizon to cover the ongoing requirements for those systems certified in FY07. In order to put the NASA systems in a cyclical review where one third of the system are reviewed each year Corporate G&A and Program customers need to budget for re-certification of one third of their systems each year as reflected in the table below.

IT C&A Agency-wide IT Services Customer Funded							
Corporate G&A	**Service**	**FY2009**	**FY2010**	**FY2011**	**FY2012**	**FY2013**	**FY2014**
OIM	IT C&A	$24,667	$24,667	$24,667	$24,667	$24,667	$24,667
OSPP	IT C&A	$170,333	$170,333	$170,333	$170,333	$170,333	$170,333
OCE	IT C&A	$37,000	$37,000	$37,000	$37,000	$37,000	$37,000
S&MA	IT C&A	$63,667	$63,667	$63,667	$63,667	$63,667	$63,667
HQ/IG	IT C&A	$12,333	$12,333	$12,333	$12,333	$12,333	$12,333
NSSC	IT C&A	$24,667	$24,667	$24,667	$24,667	$24,667	$24,667
	Subtotal	**$332,667**	**$332,667**	**$332,667**	**$332,667**	**$332,667**	**$332,667**
Program Direct	**Service**	**FY2009**	**FY2010**	**FY2011**	**FY2012**	**FY2013**	**FY2014**
ESMD	IT C&A	$24,667	$24,667	$24,667	$24,667	$24,667	$24,667
IEMP	IT C&A	$61,667	$61,667	$61,667	$61,667	$61,667	$61,667
SMD	IT C&A	$138,667	$138,667	$138,667	$138,667	$138,667	$138,667
SOMD	IT C&A	$493,000	$493,000	$493,000	$493,000	$493,000	$493,000
SOMD - Station	IT C&A	$174,667	$174,667	$174,667	$174,667	$174,667	$174,667
Threat Line for Shuttle	IT C&A	$667,333	$667,333	$667,333	$667,333	$667,333	$667,333
	Subtotal	**$1,560,000**	**$1,560,000**	**$1,560,000**	**$1,560,000**	**$1,560,000**	**$1,560,000**
Total		**$1,892,667**	**$1,892,667**	**$1,892,667**	**$1,892,667**	**$1,892,667**	**$1,892,667**

Internal Web Services

This funding is in support the InsideNASA portal (Internal Web) and associated application servers. InsideNASA has been designed to meet the new HSPD-12 and other OMB guidelines issued pertaining to web content internal to NASA as well as increasing requirements across NASA. The costs have been allocated across eleven NASA Centers and five functional entities: Exploration Systems Mission Directorate, Human Capital Management, Safety and Mission Assurance, Education, and Chief Financial Officer.

Utilization of InsideNASA

During 2007, NASA Centers were expected to migrate Center internal entry pages into the InsideNASA portal with links to the appropriate Center resources and applications. Additionally, internal sites belonging to Mission Support Offices and Mission Directorates were also to be incorporated into the InsideNASA portal.

In FY06, PDM 25 moved the Center Institutional costs from CMO to the Agency-wide IT Services project within the Corporate G&A budget. Center Institutional costs will no longer be included in this guidance. The NSSC is the only customer from Corporate G&A that must budget for this service.

Internal Web Agency-wide IT Services Customer Funded							
Corporate G&A	**Service**	**FY2009**	**FY2010**	**FY2011**	**FY2012**	**FY2013**	**FY2014**
NSSC	Internal Web	$14,572	$15,421	$15,545	$16,502	$17,492	$18,542
	Total	**$14,572**	**$15,421**	**$15,545**	**$16,502**	**$17,492**	**$18,542**

HSPD-12 Implementation

Homeland Security President's Directive (HPPD-12) enables validated workers to access Agency assets (physical and logical) that are required in the performance of their jobs, and protect assets from unauthorized access, damage, and destruction.

The following section presents project guidance within the overarching HSPD-12 initiative. Each project describes the Agency provisioning and the Center responsibilities. Centers must ensure that they budget for the resources required to meet the requirements the requirements provided in the guidance. Some of the requirements include unit cost estimations to assist in the development of the budget requirement. Figure 17 indicates the sequencing plan of activities.

SmartCards

Agency Provided Infrastructure

OSPP and OCIO have collaborated to integrate a set of products to implement the required PIV process leading to smartcard production and issuance. The Common Badging and Access Control System (CBACS), NASA Integrated Services Environment (NISE) and the Public Key Infrastructure (PKI) are all required for smartcard production and issuance.

OSPP has procured 90,000 smartcards and paid the cost to have those cards mass printed. OCIO has purchased 100,000 PKI certificate licenses to cover all badged NASA civil servants and contractors.

Center Responsibilities

HSPD-12 requires that all persons (i.e., civil servants, contractors, partners) who require physical or logical access to NASA facilities or IT assets must have a NAC-I background investigation. The centers are responsible and must budget for the cost of these investigations ($100 per person). Centers remain responsible for initiating investigations on any remaining employees, and also initiating investigations on new employees, contractors and collaborators.

Centers are required to ensure that everyone who requires a smartcard is "sponsored" for enrollment in the HSPD-12 PIV system, subsequently "enrolled" and then when the smartcards are received, that the cards are "finalized" and "issued" to the proper individual. Each Center should, by now, have a strategy in place to deal with "finalization" and "issuance".

Each Center is required to follow Agency guidance and processes for capturing basic identity information about their remote-only IT users. When the GSA shared service capability is available, Centers will be responsible for the cost of vetting the identities of the remote users. The per-person cost is expected to be approximately $100, plus the cost of the background investigation (an additional $100). Centers will be responsible for paying an annual maintenance cost of approximately $50 per person whose identity is vetted through the GSA process. In addition, Each Center must submit to and comply with any and all auditing required for the NIST SP 800-73 Certification and Accreditation processes.

Physical Access Control Systems (PACS)

Agency Provided Infrastructure

OSPP has provided the Agency-wide CBACS system for the management and control of physical access, including various numbers of stations that reside in its badging office. OSPP has also arranged the replacement of all door readers that were previously negotiated in Agency site surveys in 2004. OSPP centrally provides software applications used to issue badges and provide access control.

Center Responsibilities

The cost of any additional CBACS badging stations beyond those provided initially by OSPP will be borne by the Center. Each Center is responsible for the acquisition of any stations required for monitoring the Center/facility physical access control systems. There may be rewiring costs at a Center to support the CBACS effort in the event that a Center has not updated this part of local infrastructure in the past. This is a Center specific cost. Centers will be responsible for the cost of unplanned physical access readers and panels required.

Desktops

Agency Provided Infrastructure

The Agency has procured 100,000 licenses of the ActivIdentity middleware which is required to support smartcard use on the desktop. The supported platforms include modern Windows systems and current Mac, Solaris and Linux systems with the latest OS versions. This middleware will be made available primarily via ODIN, either through full seat services or the catalog.

The Agency is distributing USB port connected PIV compliant smart card readers for all desktops to enable smartcard usage. Additional information regarding the installation of components for enabling smart card logon on NASA desktop workstations is available via the web site http://desktop-standards.nasa.gov/HDI

Center Responsibilities

Centers shall be responsible for the cost of installation and configuration of card readers and the associated middleware. The average estimated cost per system is $75.

Centers shall also be responsible for coordination across all system owners and systems administrators.

Centers shall be responsible for determining how to adequately protect those systems that are not supported by the ActivIdentity middleware. Finally, Centers should anticipate and plan for the transition to use smartcards starting late in FY08. Eventually, desktop workstations will be configured for smartcard only logon.

Applications

Agency Provided Infrastructure

To establish and maintain positive and proactive control over who has access to which multi-user systems and applications (and ensure that each individual having access has valid identity vetting and the appropriate background investigation), the Agency has established the NASA Account Management System (NAMS). Registration of Center applications and multi-user systems into NAMS is MANDATORY.

The Agency milestones for integration of applications into NAMS and the enabling of two factor authentication have been updated to reflect schedule and technology slips. These are illustrated in Table 59 below. While NASA is still categorizing and tracking applications by FIPS 199 classifications of “High”, “Moderate” and “Low”, note that applications that contain PII must adhere to the same schedule as “High” applications. The dates for RSA token infrastructure and VPN infrastructure are also slightly different. The revised milestone dates are:

Table 61: NAMS Integration Milestones

Date	Description
9/30/08	Integrate RSA and VPN infrastructure into NAMS
6/30/09	FIPS 199 “High” applications and applications containing PII integrated into NAMS and implement 2 Factor Authentication, RSA and VPN infrastructure implement 2 Factor Authentication
9/30/09	FIPS 199 “Moderate” applications into NAMS
9/30/10	FIPS 199 “Moderate” applications implement 2 Factor Authentication; FIPS 199 “Low” applications integrated into NAMS
9/30/11	FIPS 199 “Low” applications integrated into NAMS

An initiative to ramp up the integration of applications into NAMS is commencing. Center AAO and NAR-WG representative are receiving guidance now on the planning required, which will include discussions with each application owner to obtain commitments on schedule. Progress against Center schedules will be tracked at the Agency level. More comprehensive and sophisticated guidance on two factor authentication will be provided to the Centers throughout the year.

Center Responsibilities

The Center AAO is responsible for working with all Center application owners to establish a schedule and plan for when each application will be integrated into NAMS and when (and how) each application will implement 2 factor authentication. Each application owner must bear the implementation cost of integrating an application into NAMS. The original estimated cost of integrating an application into NAMS is $6000, although improvements presently being made to the overall process should result in a substantial reduction to that estimate.

Each application owner must also pay the implementation cost of retrofitting an application to support two factor authentication. If an application already authenticates to an Active Directory implementation, the cost of implementing two factor authentication will be negligible. Otherwise, regardless of the authentication mechanism selected, the average estimated cost per application to implement two factor authentication is $10,000. The work associated with implementing two factor authentication consists largely of removing an existing authentication mechanism and integrating the new authentication source.

Centers should seek to achieve the cost savings and risk mitigation offered by the sunsetting of legacy systems, old unsupportable technologies and processes that have been overtaken by events. Centers should establish an 18-24 month plan to clean up identity-based data feeds and systems and decommission as much of that legacy infrastructure as possible.

Active Directory

Agency Provided Infrastructure

The Agency is deploying a distributed active directory system that has centralized policy/procedures; this includes both the domain controllers at each center and the domain controllers within the NASA Data Center (NDC).
Additionally the Agency has purchased enterprise active directory management tools from NETIQ. These tools will support AD migration and long term management of the enterprise active directory system (e.g. domain controllers). This tool will be made available to active directory personnel at all Centers (allowing varying levels of administration granularity).

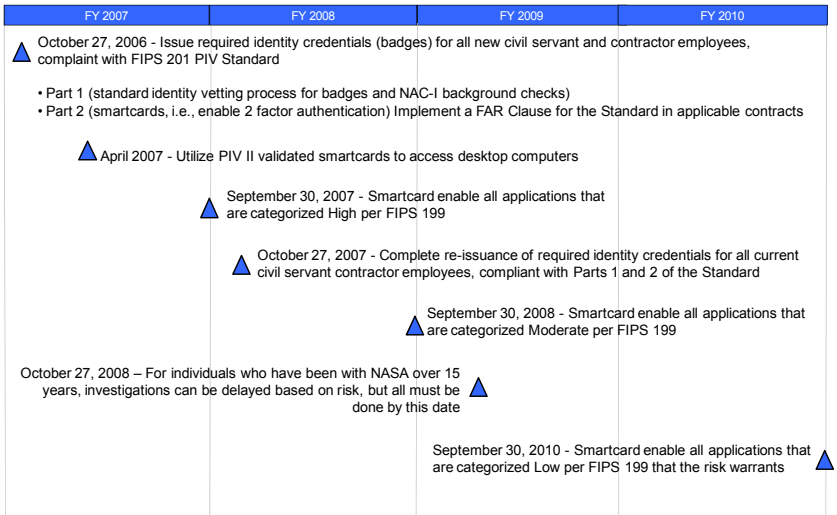
Center Responsibilities

Each Center must effectively coordinate and execute the collapse of all existing Center domains into the single Center forest. Each Center must also provide adequate resources to implement the transition of all users from existing Center-unique usernames to the Agency unique userids, and all systems and resources from existing Center-unique names to the Agency unique names.

Each Center must coordinate all aspects of the transition to the new environment with all affected parties and allocate sufficiently skilled personnel to implement the transition. Each Center must also manage the transition of user accounts, workstations, groups and other resources from current management tools to the Agency NetIQ Directory and Resource Administrator tool.

Each Center must provide floor, rack space, power, and internal network connectivity (in a location to be negotiated) for the equipment the Agency is providing. Each Center must also provide minimal operator functionality (e.g. power on, reset, and CD loads) for the equipment located at the Center. Finally, each Center must consider the cost associated with each of these responsibilities and budget accordingly.

Figure 17: Sequencing Plan for HSPD-12



Enterprise Architecture

The NASA Enterprise Architecture is a strategic tool that links NASA's mission, business, and IT strategies. The architecture provides the fundamental methodology and framework for defining how NASA's IT will work. Key elements of the architecture include Customer Boards, Governance, Configuration Control Board(s), and the IT Service Model.

IT Security

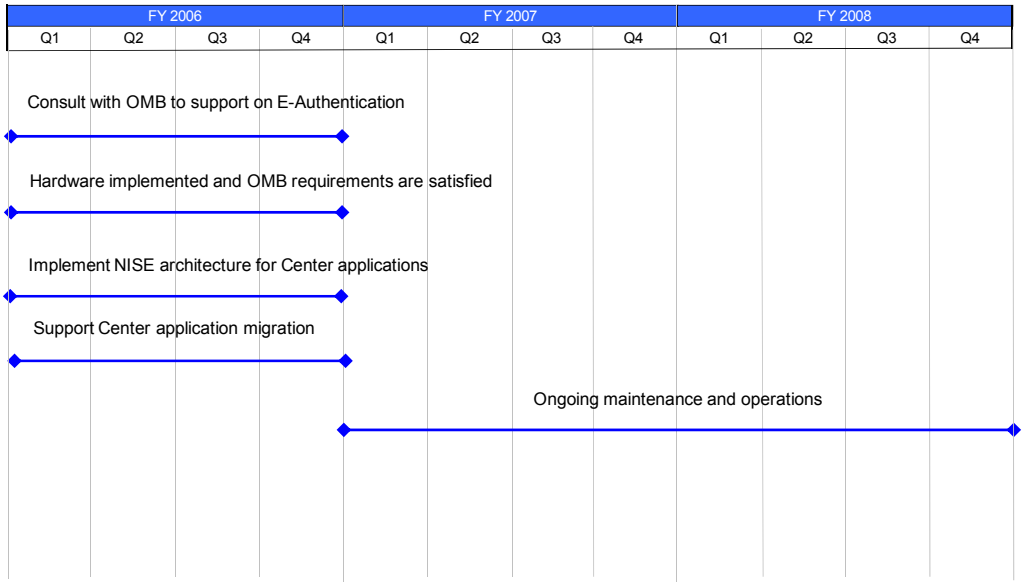
Security crosscuts all of IT and is an integral component of all the service areas and each of the components included within this program. NASA policy for ensuring that adequate security is provided for all agency information collected, processed, transmitted, stored, or disseminated is set out in NASA Policy Directive 2810.1, "NASA Information Security Policy." Detailed procedures and guidance are contained in NASA Procedural Requirements 2810.1, "Security of Information Technology." These instructions provide direction for ensuring that safeguards for the protection of the integrity, availability, and confidentiality of IT resources (e.g., data, information, applications, and systems) are integrated into and support the missions of NASA.

In addition to Agency and Center wide ongoing security operations, this program includes near-term Agency wide security initiatives to correct known vulnerabilities, reduce barriers to cross-Center collaboration, and provide cost-effective IT security services in support of Agency-wide applications and services, as well as e-Gov initiatives. These initiatives were proposed as new starts for FY04, and milestones developed assuming a first quarter FY04 start. However, due to delays in approval of NASA's FY04 Operating Plan, these initiatives were not able to be started until the fourth quarter. Two of the initiatives reported last year – Account Management and Cyber Identity Management – have been consolidated and integrated with another related activity – Identity Management System – into a single initiative called the NASA Integrated Services Environment (NISE).

NASA Integrated Services Environment (NISE)

NISE consists of four major areas of focus. The Identity Management System (IDMS) will be the authoritative single source of validated identities for NASA, and provide a central repository of identity information. The Cyber Identity Management System (CIMS) will provide a unified Enterprise Directory for retrieving end user identity information. CIMS will ensure the transparent and secure exchange of identity across the Agency. The NASA Account Management System (NAMS) will provide consistent and accurate account management across the Agency. NAMS will allow immediate changes to user accounts throughout the system. The NASA e-Authentication Initiative will allow identity credentials to be passed between most applications without additional authentication using the Inside NASA Web Portal service as its foundation.

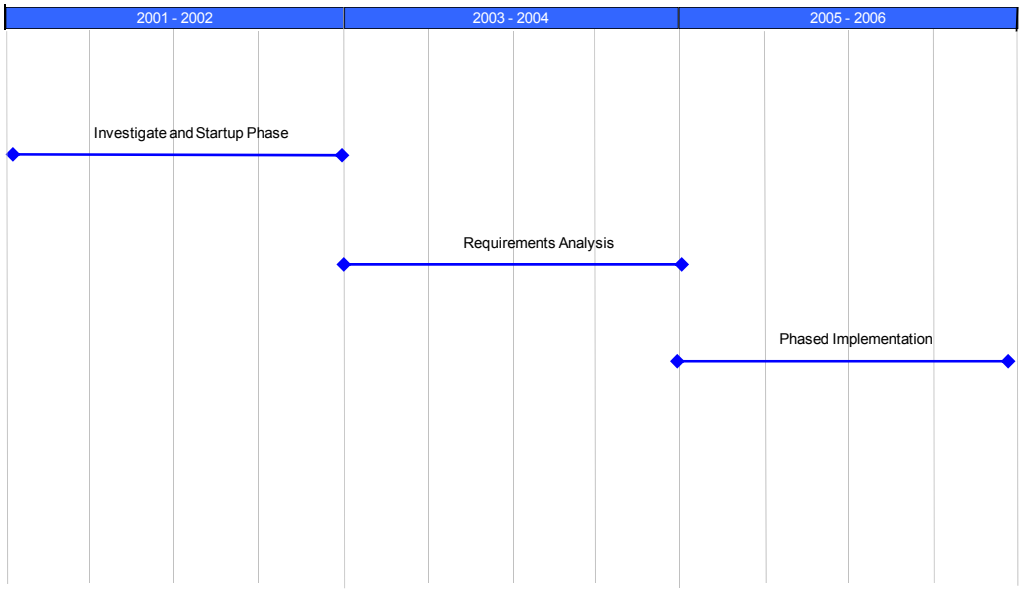
Figure 18: Sequencing Plan for NASA Integrated Services Environment (NISE)



CBACS

The Common Badging and Access Control System (CBACS) is the defined solution integrated at the Agency level for Enterprise Physical Access Control System (e-PACS), Identity Management System (IDMS), and SmartCard/ Central Card Management System (CCMS). CBACS will result in the eventual retirement of legacy-based dissimilar access control and identity systems.

Figure 19: Sequencing Plan for Common Badging and Access Control System (CBACS)



Wide Area Network (WAN)

This component consists of a set of wide area networks that support production services, as well as services provided by several Internet Service Providers (ISP). The WAN Architecture Team identified and documented the following objectives for the WAN Implementation Sub-Project:

- Migration to Synchronous Optical Network (SONET)/Lambda services in the NASA WAN core;
- Demarcing carrier services and monitoring equipment at carrier independent exchange facilities (CIEFs);
- Providing SONET/Lambda services to NASA Centers;
- Providing incremental security improvements leading to eventual implementation of an Agency security perimeter;
- Providing traffic flow monitoring within the NASA WAN; and
- Follow OMB's TIC guidance for reducing the number of ISP connections.

Local Area Network (LAN)

The LAN component incorporates all IT investments required to provide networking services within a building, campus, data center, or Center; including hardware, software, and services (including wireless LANs, remote access, DNS, network management, X500/directory services). The operational state of LAN services varies greatly from Center to Center. Since this capability evolved over time, there are a diverse set of LAN architectures across the Agency. NASA's approach to integrating the management of the LAN environment is to define an Agency standard LAN architecture that Centers will build to as future LAN upgrades take place. The definition of this architecture was completed and approved in June 2003, and most Centers have LAN upgrade projects progressing as funding permits.

Voice

The Voice component includes all elements that provide voice services to users including hardware, software, services, and communications that are not provided by NASA WANs.

The voice element includes local and long-distance telephone services, cell phone service, satellite phone service, teleconferencing, voice mail, fax, and ancillary services such as two-way radios, emergency warning systems, and public address systems. Long Distance Service (LDS), 800 numbers, and calling cards are obtained from the GSA FTS2001 contract. Several Centers have upgraded their voice network infrastructure in recent years. At this time, integration and consolidation efforts are focused primarily on the use of common service providers where feasible.

VoIP

Transition to the use of Voice over Internet Protocol (VoIP) is viewed as the most viable means of consolidating this service Agency-wide in the future, but a recent feasibility study conducted last year by GSA on NASA's behalf determined that this is not a cost-

effective approach for the Agency at this time. However, as the technology matures, the use of VoIP will potentially enable not only the consolidation of voice services, but also the convergence of the voice and data infrastructures.

Because of the nature of NASA's business there are instances that necessitate an exception to an established requirement. JSC's directorate has requested and received permission to procure VoIP hardware to explore its possible use in space suits and other orbital equipment. There are no plans or expectations to ever connect this equipment into the agency VoIP telephony system.

Video

This category includes investments for hardware, software, and support services required to support video and video distribution and video conferencing, not including LAN or WAN. Video services include Video Teleconferencing Systems (ViTS), digital video production equipment and facilities, video distribution systems and video repositories. ViTS capability is provided as part of an integrated Agency-wide service through NISN, as is video distribution between Centers. At this time, further integration and consolidation efforts are focused on setting Agency standards to which Center systems will be built, using common service providers where feasible, and the sharing of video repositories where practical. In addition, it is expected that as networks are upgraded and desktop videoconferencing becomes more widely available, that there will be an opportunity for convergence with the voice and data infrastructure.

Desktop

NASA's desktop hardware and software environment is categorized as 1) desktops used for "corporate" functions, 2) workstations used by scientists and engineers to conduct research and development as well as "corporate" functions, and 3) desktop systems used for mission-specific functions, such as a laboratory environment for data acquisition or process control that are not interoperable with "corporate" systems (these systems are not reported under this component).

Corporate Desktop Systems: The majority of NASA's desktop hardware and software services (including peripherals such as printers) are performed under the Outsourcing Desktop Initiative for NASA (ODIN) Program, especially those used for "corporate" functions such as electronic mail, office automation, integrated financial management, and scheduling. ODIN is an Agency-wide program to outsource the majority of NASA's desktop computing, server and intra-Center communications services under a seat management service model. ODIN develops a long-term outsourcing arrangement with the commercial sector for information technology services and transfers to it the risk and responsibility for providing and managing the personnel and equipment necessary to provide these services. Currently, 38,000 desktops are provided under this approach across the Agency.

Seven IDIQ contracts were awarded in June 1998 under a multiple award structure. Under this Program, ODIN can be utilized by other Agencies as a Government-wide Acquisition Contract in cooperation and accordance with General Services

Administration's Federal Technology Service organization. Delivery orders for services can be issued under the 7 contracts through 16 June 2007, with no delivery order period of performance extending beyond 30 June 2010.

Currently, there are delivery orders in place to provide services at 10 NASA Centers: Ames Research Center, Dryden Flight Research Center, Glenn Research Center, Goddard Space Flight Center, NASA Headquarters, Johnson Space Center, Kennedy Space Center, Langley Research Center, Marshall Space Flight Center, and Stennis Space Center.

Scientific and Engineering Workstations: Many of NASA's scientific and engineering workstation requirements are accomplished under the ODIN Program. However, one size does not fit all, and ODIN is no exception. The science and engineering community often has needs that extend beyond the capabilities of the ODIN program to fulfill. In these cases, each Center, Directorate, or Project (as appropriate) acquires the appropriate level of hardware, software, and support service as needed to fulfill mission requirements. Scientists and engineers are generally very competent in managing computer systems to conduct engineering and research. Their configurations are customized to their assignment and do not always fit in well with Center configuration control processes for general purpose hardware and software. "Corporate" applications often represent a minor portion of the scientific and engineering workstation configuration. Hardware and software are usually procured through an Agency-wide contract (the NASA Scientific and Engineering Workstation Procurement (SEWP)) and services are performed either by the scientists and engineers or support service contractors associated with the project with expertise in advanced applications.

Messaging & Collaboration

This component includes IT investments to provide email, instant messaging, and collaborative tools. Two key near-term elements are e-Presence and eXtensible Markup Language (XML).

E-Presence: Historically, NASA Headquarters, the Centers, and their satellite facilities have taken a "site specific" approach to the provision of electronic messaging services. As a result, the NASA electronic messaging environment today is a collection of diverse products and system implementations, with capabilities that vary from site to site. The objective of the e-Presence initiative is to increase collaboration across the Agency by providing a common electronic messaging system and a set of common collaborative tools to support virtual teams.

A pilot activity for the messaging component of this initiative was conducted in FY04 involving two solutions chosen through a competitive process. The pilot had 200 participants across 6 Centers and was based on an Application Service Provider service delivery model for email, calendaring, and file sharing. While the pilot demonstrated the technical feasibility of the service delivery model, it also demonstrated that it was not possible to employ that model in production without first deploying the Agency-wide directory planned as a part of the NISE initiative discussed earlier.

The virtual teaming element has completed pilot activities involving the two general categories of tools that support virtual team collaboration – those that enable virtual team meetings and those that provide a virtual team workspace. The WebEx tool for virtual team meetings has proven very successful and is in the process of transitioning to an operational environment on a fee-for-service basis. Virtual Team Workspace tools continue to be investigated.

XML: The XML initiative supports data interoperability across NASA, other agencies, and NASA partners. NASA has entered into an agreement with DOD/DISA to use their XML Registry to store NASA XML information. This partnership has been very successful and has given NASA the opportunity to learn from DISA's experience and to further refine our requirements. We are currently in the process of documenting an agreement with DISA for expansion of the registry to meet NASA-unique requirements.

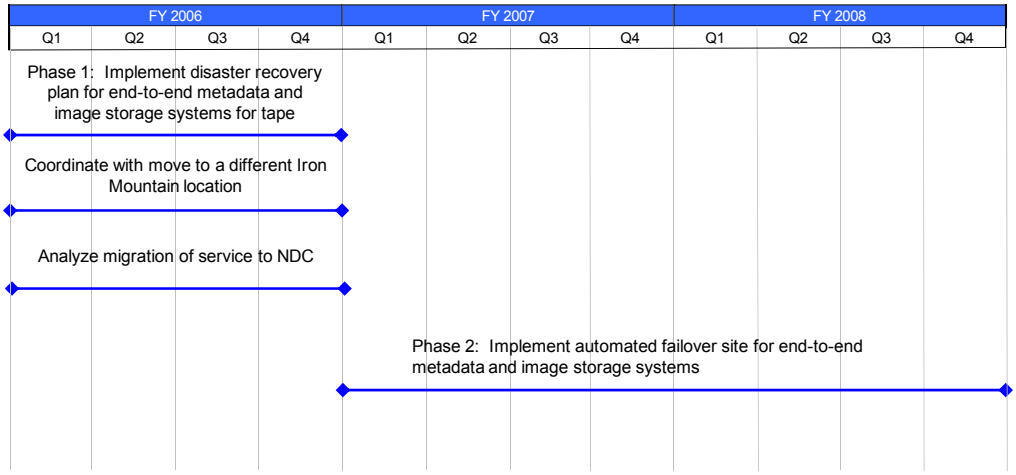
This effort will advance the implementation of XML standards across NASA. The goals are to:

- "Future proof" information against periodic technology change, facilitate integration, and promote collaboration;
- Reduce the cost of integrating data, replication of data, and warehousing (where these are clearly needed); and
- Allow communication between applications running on different Web servers.

Scientific and Technical Information (STI)

NASA's Scientific and Technical Information (STI) program exists to collect, organize, and provide fast access to NASA and worldwide STI by increasing the amount of NASA and worldwide STI available, and safeguarding NASA's legacy and current collection of STI. STI has become a major component in e-Gov and e-NASA activities by expanding its collection of electronic documents, and providing documents directly to desktop in full-text digital format. STI continues to be a worldwide leader in providing aerospace information, and educating customers to locate and effectively leverage STI.

Figure 20: Sequencing Plan for Scientific and Technical Information



NOMAD

The OCIO implemented the NASA Operational Messaging and Directory (NOMAD) project to assume all efforts related to implementation of messaging and calendaring for the Agency. NOMAD was be implemented in 2 phases: Phase 1 built on the original Headquarters Enterprise Messaging Initiative (HEMI) and Continuous Operations Messaging (COM) implementations along with multiple architectural changes, governance, process improvements, and contingency capabilities; Phase 2 encompassed the delivery of services to the balance of the agency, integration of HEMI, additional architectural changes (32 vs 64 bit) and contingency improvements.

It is a steady state investment that will continue to add technology refreshment and improvements as requirements demand.

Applications

Application services provide a service to end-users. Applications services include the development, operations, and maintenance of applications that are not desktop services. Included are investments in hardware (not a part of a data center), software and services required to provide application services remote from a desktop and not provided by a data center. This includes design, development, help and other support, operations, and maintenance.

This area includes applications that provide services to the entire Agency, as well as Center-specific applications. At the Center level, this is a combination of services provided to the entire Center and services to support small subsets of users with unique requirements. Consolidation efforts have focused on identifying commonality among Center-specific applications and conducting business case analyses for classes of similar applications to determine whether consolidation of the service at the Agency level is cost effective.

Public Web Services

This component includes Center- and Agency-wide development and hosting services focused on providing Web access to information.

One NASA Portal: The NASA Portal is aimed to provide U.S. Citizens with a single point of entry to NASA's Public Information Assets in a way that provides citizens with the most up-to-date NASA information allows them to easily navigate to additional information specifically suited to their needs, presents a consistent look and feel to the NASA "Image", and provides quality content to the general public in each presentation. The NASA Portal has enabled www.NASA.gov to become a powerful way to generate public interest, spark dialogue and learning, and unearthing a renewed sense of pride and interest in NASA.

Agency Web Site Registration System (AWRS): AWRS is a centralized, Web-based system for conducting Web site registration and Web server inventory. Functions include:

- Registration of NASA public and private Web sites and sites with NASA content that are externally hosted;
- Inventory of NASA Web servers (hosts) located anywhere in the Agency that serve Web sites which require AWRS registration;
- Agency- and Center-level reports on Web servers and Web sites including contact, compliance, and content info; and
- Initial and periodic policy- and content-based reviews of Web sites for adherence to NASA and organizational mission and compliance with IT policy and security requirements.

It is a steady state investment that will continue to add technology refreshment and improvements as requirements demand.

InsideNASA

InsideNASA (http://insidenasa.nasa.gov) is an internal portal for Agency personnel (employees and on site contractors) to communicate, collaborate, share knowledge, and quickly find information they need to get their jobs done.

This portal is primarily an integrator of distributed information, although it also hosts content when appropriate and when needed. Distributed content providers and developers provide content and local championship. Applications can be integrated into the portal as required by users. InsideNASA is built upon the NASA Portal. It completely shares its management, security, hosting infrastructure, common hardware platform, and common software.

It is a steady state investment that will continue to add technology refreshment and improvements as requirements demand.

NASA Engineering Network (NEN)

NEN is a robust, flexible knowledge management system that provides a multipurpose community management tool, task management tool, and lessons learning tool. It allows for managing and sharing of discipline standards, requirements, and processes with a minimum of labor. It includes ITAR/EAR-compliant space for restricted content. NEN integrates a content management system, portal, search engine, and engineering community management system in support of engineering discipline communities and NASA lessons learned. It is built on the NASA Portal and InsideNASA, to reach across organizations and ensure that information is made available across NASA secured networks.

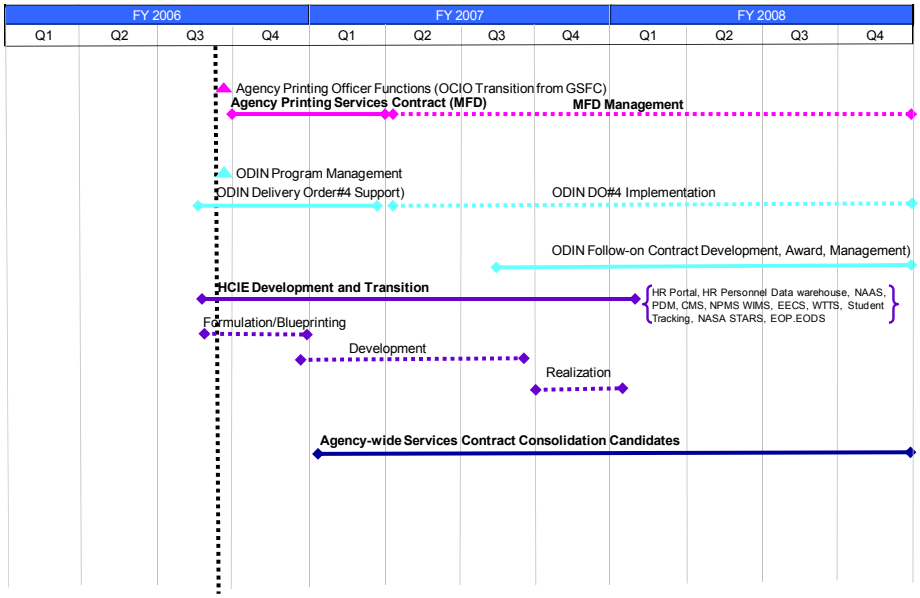
It is a steady state investment that will continue to add technology refreshment and improvements as requirements demand.

NASA Shared Services Center (NSSC)

The NSSC was established to consolidate shared services organization that would provide higher quality, more cost effective and efficient services for selected NASA business and technical services. The NSSC is:

- A Center that consolidates targeted activities into a separate, independent NASA Center that reports to HQ;
- A Center that will perform a variety of transactional and administrative activities currently being done at each Center within Human Resources, Information Technology, Procurement, and Financial Management;
- A successful and common industry model for achieving cost and efficiency savings; and
- An approach that integrates work across NASA to provide high quality, efficient, and consistent service to customers inside and outside the Agency.

Figure 21: Sequencing Plan for NSSC Transition Schedule By Service

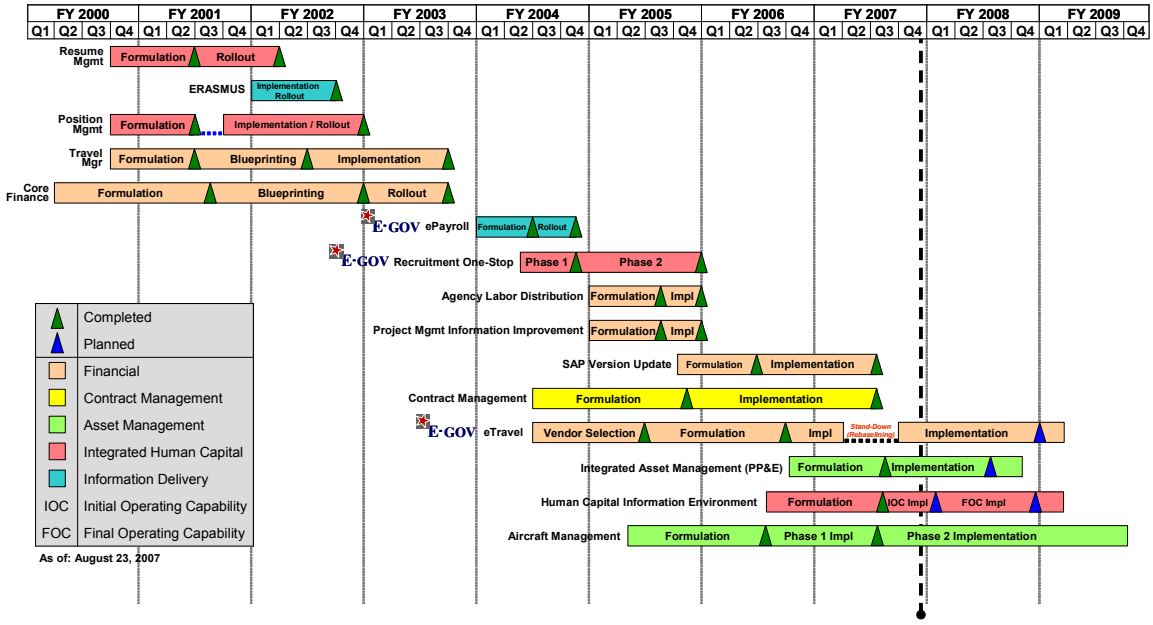


Integrated Enterprise Management Program (IEMP)

Since 2003, the Core Financial (CF) system has served as NASA's financial accounting system of record and is its financial management "backbone," providing NASA's core accounting functionality. In fiscal year (FY) 2003, NASA migrated from 10 disparate legacy financial systems to 1 core accounting system. CF has been structured to ensure that NASA makes measurable and demonstrable progress toward achieving: the PMA Scorecard standards for success in Improved Financial Performance, compliance with FMFIA and FFMIA, an unqualified financial audit opinion, and alignment with the Financial Management Line of Business. The investment consists of 4 major components, which comprise NASA's comprehensive strategy and action plan for financial management modernization and improvement. This investment is designed and planned to support improvements to the three central areas that affect financial performance: business processes, technology (systems/software), and reporting/data.

NASA's comprehensive strategy and action plan for financial management modernization and improvement are designed to fully address and resolve concrete deficiencies and immediate management challenges. Funds requested to complete and stabilize the SAP Version Upgrade will correct several fundamental and outstanding material weaknesses issued in recent audit reports. Most notably: (A) Lack of Internal Controls Surrounding Costs in Excess of Obligations and Downward Adjustments. (B) FFMIA Compliance / Upward-Downward Accounting Adjustments.

Figure 22: IEMP Transition Strategy



Appendix A: Reference Documents

NASA Strategic Documents:

1998 International Space Station Agreement
2003 NASA Strategic Plan
2004 Vision for Space Exploration
2006 NASA Strategic Plan - http://www.nasa.gov/pdf/142302main_2006_NASA_Strategic_Plan.pdf
Information Resources Management (IRM) Strategic Plan September 2007 – http://www.nasa.gov/pdf/160990main_OCIO_IRM_Srategic_Plan-Sep_2007.pdf
NASA Authorization Act of 2005
Space Act of 1958

NASA Policies: http://nodis3.gsfc.nasa.gov/main_lib.html:

NPD / NPR 2810.1 NASA Information Security Policy
NPD 1000.0 Strategic Management and Governance Handbook.
NPD 1000.3C The NASA Organization
NPD 2830.1 NASA Enterprise Architecture Policy Directive
NPD/NPR 2800.1 Managing Information Technology
NPR 7120.5C NASA Program and Project Management Processes and Requirements
NPR 7120.7 NASA Space Flight Program and Project Management Requirements

Enterprise Architecture Documentation:

EA Communications Plan
EA Program Executive Overview
EA Training Plan
EA Value Measurement Survey Analysis
Mission Support Service Segment Architecture v2 0
NASA EA Legacy Systems Portfolio
NASA Enterprise Architecture: Value Measurement Plan
NASA Transition Strategy
SOMD Segment Architecture, version 2.0

Additional Relevant NASA Documents:

2008 NASA Transition Plan for SOMD and ESMD
FY2008 Budget Estimates (168652main_NASA_FY08_Budget_Request (2).pdf)
Information Technology Capital Planning and Investment Control (CIO CPIC Guidance 41805.doc)
Mandatory Technical Standards http://standards.nasa.gov
NASA Annual Performance and Accountability Report.

NASA eGov initiatives, FY 08-09 IBPD_Egov only_final.doc
NASA IT Program Resource Guidance, January 2008 (FY 2010 PPBE NASA Information Technology Program Resource Guidance[0])
NSSC Implementation Plan Report, September 2003
Strategy for Improving IT Management at NASA, December 4, 2007

Federal Enterprise Architecture Documents:

(NASA) 2007 OMB Enterprise Architecture Assessment Results, April 19, 2007
EA Assessment Framework V2.1
FEA Consolidated Reference Model Document Version 2.3, October 2007
FEA Practice Guidance (FEA_Practice_Guidance_Nov_2007.pdf)
Federal Enterprise Architecture Program EA Assessment Framework 2.2, October 2007
Federal Transition Framework Catalog of Cross Agency Initiatives Version 1.0 December 2006
The Data Reference Model, November 17, 2005

Other NASA Sources:

Investment performance and FEA information is maintained in the ProSight Capital Planning module.