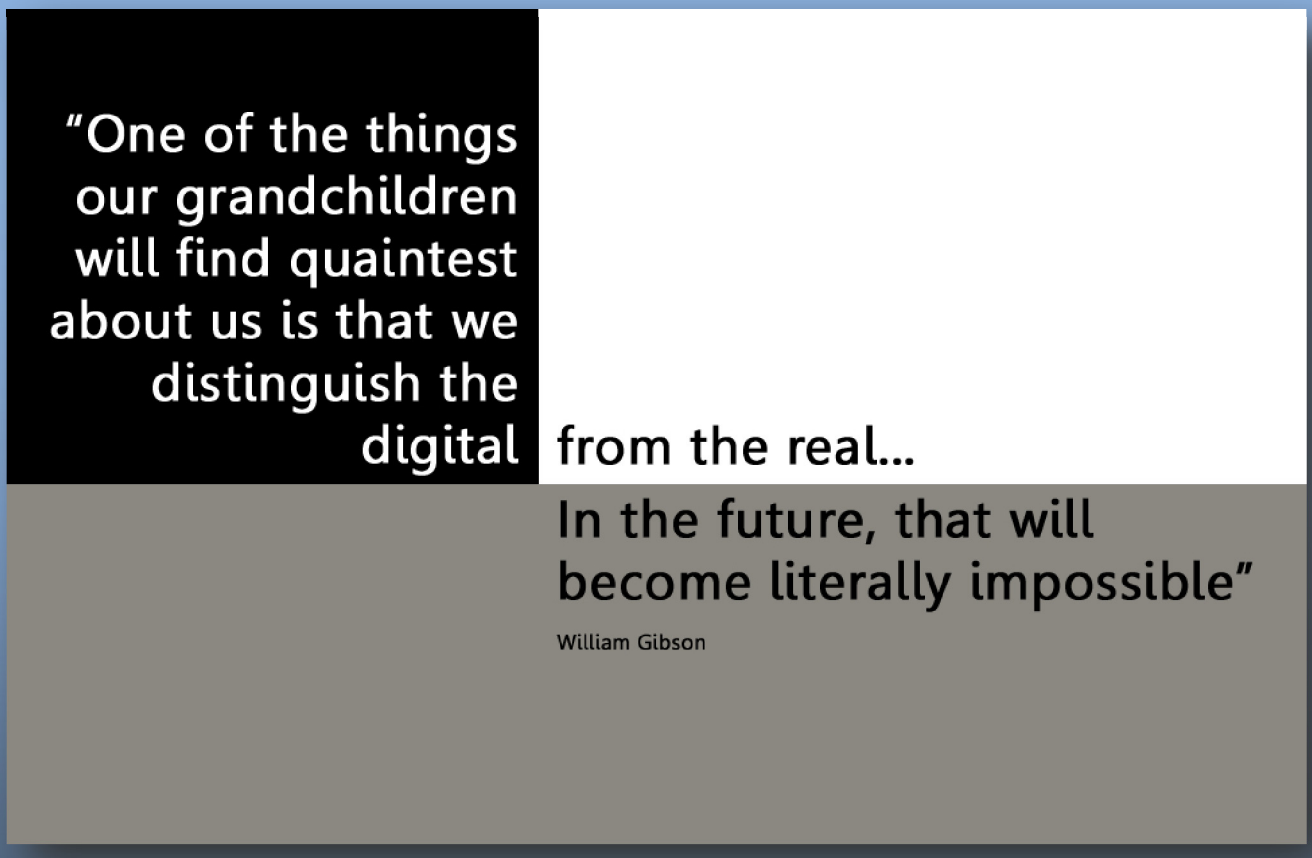
FY 2009 to FY 2014

Smithsonian Institution Information Technology Plan



Message from the Chief Information Officer

The Smithsonian has outlined a vision for the Institution and established goals that recognize the need to enhance public impact, perform first-class scientific research, modernize management systems, and achieve financial strength. As Chief Information Officer, my staff and I collaborate with Smithsonian leadership to use information technology (IT) to help realize the vision and achieve the goals of the Institution. The *Smithsonian Information Technology Plan* (SITP) documents the role that IT plays in achieving these goals, and will guide the Smithsonian's IT program during the FY 2009–FY 2014 planning period.

Throughout FY 2009, the Smithsonian is revisiting the execution of its mission to create a strategy that will keep the Smithsonian relevant in the decades to come. This strategy will require technology solutions that will influence the future of how information is accessed, used, and managed in carrying out the mission of the Institution.

Given what we know about the mission and technology today, what should the enterprise look like? We cannot use IT to simply automate old processes. Likewise we do not want legacy IT systems to drive processes and customer relationships. In the strategic plan, process and IT need to fit together in a natural way to best deliver the vision. As the Smithsonian's Chief Information Officer, I want you to view me and my organization as partners in identifying and implementing IT solutions Smithsonian-wide to harness opportunities to remain relevant to current and future generations.

Ann T. Speyer **May 7, 2009**

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Knowledge should not be viewed as existing in isolated parts, but as a whole. Every portion throws light on all the others.

-- James Smithson

A. Mission and Vision

The Smithsonian Institution is a trust instrumentality of the United States founded in 1846 in response to the will of Englishman James Smithson who bequeathed the whole of his property to the United States of America with the mission "to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge."

In the 160 plus years since that time the Smithsonian has grown as a cultural and scientific complex of museums, research centers, and offices to include 19 museums, the National Zoological Park, and 9 research centers. In addition to Washington, DC and its metropolitan area, the Smithsonian maintains facilities and staff in New York City, New York; Cambridge, Massachusetts; Fort Pierce, Florida; near Tucson, Arizona; and Panama. The Smithsonian employs approximately 6,000 staff and 6,500 volunteers; has over 137.2 million collection objects; and in FY 2008, hosted over 173 million visitors to its public websites.

Strategic Vision

The Smithsonian's vision and established goals recognize the need to enhance public impact and engagement, pursue scientific discovery and advances in areas of recognized Institutional strengths, and provide the financial support essential to achieving all of them.

The *Smithsonian Information Technology Plan* (SITP) documents the role that information technology (IT) plays in fulfilling this vision. It describes an IT environment which enhances the quality of services provided to the public each year through museums and outreach activities, and to the scholarly community through research in disciplines that range from astrophysics to zoology.

OCIO Mission

To maintain and modernize the Institution's information technology systems, services and infrastructure in a secure, standards-based IT environment while seeking ways to apply technology to the priorities of the Institution for the increase and diffusion of knowledge.

OCIO Vision

To develop and maintain information technology and telecommunications solutions such that anyone, anywhere can access and use Smithsonian information while conducting mission-related work, or as an external participant seeking to explore and leverage Smithsonian knowledge.

B. Goals & Objectives

Smithsonian Goals & Objectives

The Smithsonian seeks to become a model of service to the public and the scientific community through its museums, publications, outreach, and research activities. To support this vision, the Institution is executing a program that encompasses four strategic goals:

Increased Public Engagement – Diffusion of Knowledge.

Enlarge the Smithsonian's audiences, expand its degree of involvement with the public, and improve the quality of its impact on audiences through public programs and scientific research.

Strengthened Scientific Research – Increase of Knowledge.

Pursue scientific advances and discovery by focusing resources on areas in which the Institution has recognized strengths because of staff, research platforms, and collections.

Enhanced Management Excellence.

Modernize Smithsonian management systems by bringing each of them to a level of quality and sophistication appropriate for an organization the size and complexity of the Institution.

Greater Financial Strength.

Provide the financial support essential to achieving these goals.

During FY 2009, the Institution is undergoing a pan-Institutional strategic planning process. Once completed, the resulting plan will update the Institution's goals and shape future directions of the *Smithsonian Information Technology Plan*.

IT Strategies

OCIO's overarching aim is to provide a consolidated IT infrastructure which supports its internal and external customers. To this end, the Institution is committed to acquiring the resources needed to: (1) maintain and build upon the robust and mature IT infrastructure put in place over the past seven years; (2) continue to build a consolidated, secure IT infrastructure for Smithsonian digital assets (collections; scientific data); (3) to fully support storage, preservation, and access by all internal and external stakeholders. As our IT infrastructure continues to evolve, IT will be better positioned to increase its value to the mission of the Institution.

This can best be accomplished by aligning the IT vision, strategies, and direction with the overall Smithsonian mission, vision, and goals to ensure that the Institution can meet demands for ready access to information related to visitor services, collections, research, exhibitions, and administrative processes.

Strategic planning is the process that tries to make explicit the current and the future state, as well as the critical changes that need to be made between these two points. During this process, we must answer these questions:

1. What are the Smithsonian's priorities?
2. How can IT be used to overcome challenges?
3. How can IT help the Smithsonian succeed?

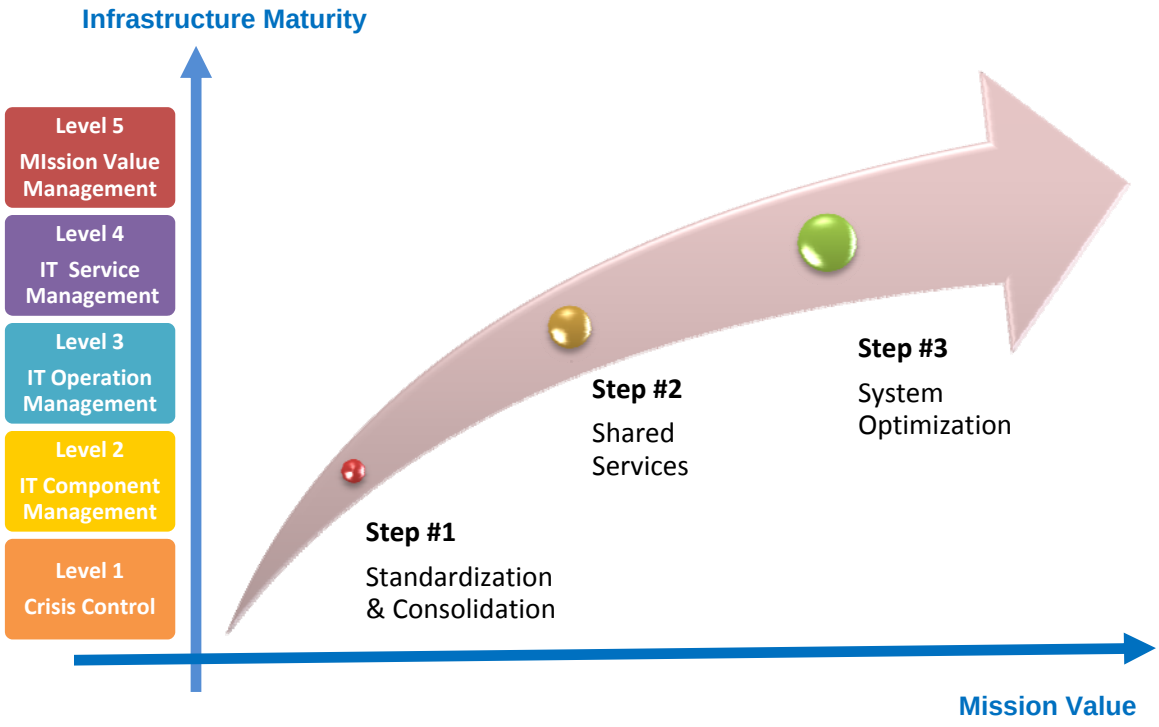


Figure 1: IT Roadmap for Increasing Mission Value

C. Information Technology Management Goals & Objectives

Establishing goals and objectives is a key part of planning for the effective use of IT resources. These objectives provide direction to the Smithsonian's IT program, and are aimed at improving the quality of products and services, as well as how they are delivered.

C-1. Build the Digital Smithsonian Framework

Goal: Build the Digital Smithsonian Framework

Build a consolidated, secure IT infrastructure for Smithsonian digital assets (collections; scientific data) to fully support storage, preservation, and access by all internal and external stakeholders.

For more than two decades the Smithsonian has been digitizing information about the 137.2 million objects and specimens, 89,000 cubic feet of archival materials, and 1.5 million library holdings in its collections. Our job is to authenticate and inform the public about the significance of the collections not to restrict access to them.

Initially, digitizing our collections meant capturing textual information about our collections in electronic form and organizing it into databases. Overtime it has evolved to creating digital surrogates as digital images, audio, and video information in electronic form, and making it accessible to staff and outside scholars for research, and to the public for educational purposes. The Institution also increasingly needs to manage digital assets which are "born digital" such as digital audio files, digital photographs, and digitally captured data—all of which do not need to be converted.

By digitizing collections, archives, library, and research information, the Smithsonian can continue to focus on its founding mission to increase and diffuse knowledge while simultaneously pursuing its current objectives of dramatically enlarging its audiences and the degree of engagement with them, and strengthening its scientific research. Digitizing our collections will help the Institution meet its founding mission to increase and diffuse knowledge broadly, deeply, and personally. Throughout the Institution an urgent need exists to enrich records with textual information and images, and to make this information available to the public on the web.

The Smithsonian uses multiple collections information systems (CIS) which include digital surrogates of collection objects and metadata at various stages of maturity. To date, there are only 13 million automated records; and a digital image exists for only slightly more than 2 million of these objects. About 3.5 million of the automated records and nearly 600,000 digital images are available through the Institution's public website. The Institution's online exhibits and research databases available to the public via the World Wide Web are derived from the digital information contained in its collections systems. It is no longer acceptable for us to share only one percent of our specimens and artifacts in an age when the Internet has made it possible to share it all. In doing this, the relevance of the Smithsonian to education can be magnified many times over.

Digitization efforts are being driven by Smithsonian visitors and colleagues who have growing expectations for digital access to our information and collections; and the need for stewardship and preservation of our collections with digital surrogates of physical objects. While documentation exists for most records, many are skeletal and lack images.

Over the long term, each museum will enrich registrarial-level records with research findings and curatorial notes that have been separated from them. This means that researchers, curators, librarians, archivists, registrars, and managers have access to rich and consistent digital information about collections. Researchers around the world who use collections for scholarly purposes—to identify objects or species, to assess the biodiversity of a region, to examine aspects of American cultural history—also will be able to access data electronically. To ensure the information is accessible in the future, we must also develop data migration plans which define the procedures to ensure the integrity of these digital assets overtime as storage formats and/or systems continuously evolve.

The technology needed to digitize, store, and access this digitized information is readily available in the commercial market yet due to funding constraints we have not yet been able to establish a robust and adequately sized digital infrastructure needed to appropriately support the small percentage of our collection which exists digitally.

Enterprise storage is an area of prime concern. Without having the required central capacity units and projects are acquiring their own storage solutions at extra cost to the Institution, and many of these solutions lack adequate back up plans putting the digitized information at risk. In the best instances digital assets are being stored and managed in enterprise-level collections information systems and in a digital asset management (DAM) system. However we know that many smaller digitization efforts do not have access to these systems and are therefore at increased risk.

frame·work (frām'wûrk) n.

A structure for supporting or enclosing something else, especially a skeletal support used as the basis for something being constructed.

At the most basic level, failure to develop standardized digitized repositories of its collections threatens the ability of the Smithsonian to execute its responsibility for their stewardship and preservation for the collections it holds on behalf of the American public. This responsibility, as well as legal issues inherent in relationships with donors, vendors, and others, demand that collections be managed to the highest standards of security and safety, and in a manner that provides the greatest benefit to the public. The CIS will facilitate physical and legal control of collections as required by law; completing inventories more reliably and rapidly; recording conditions of collection objects in a uniform way; and facilitating better prioritization and scheduling of object treatment for exhibitions and loans.

FY 2009-FY 2014

- *Objectives during this planning period*

1) Ensure that the Smithsonian IT infrastructure and framework—particularly storage, backup, and network connectivity—enables the exchange of digital assets, including related metadata, regardless of where they reside.
2) Establish enterprise-level mission support systems that enable the Institution to transform and remix its collections and research data in ways yet to be imagined, produce excellent museum exhibits and educational programs, and develop innovative ways to diffuse knowledge by enhancing and expanding our national and international outreach efforts to reach new and more diverse audiences.
3) Complete the development of the Enterprise Digital Asset Network (EDAN) to facilitate the discovery and repurposing of digital assets that cut across museum, research centers, libraries, and archives at the Smithsonian.
4) Implement a fully functional enterprise Digital Asset Management (DAM) system with adequate storage and backups for use throughout the Smithsonian.
5) Work with data owners to implement full life-cycle Data Management Plans for their digital collections and assets.
6) Evolve Smithsonian storage procedures towards the development of Trusted Digital Repositories (TDR) in order to provide reliable long-term preservation and immediate access to managed digital resources for both our internal and external users.
7) Ensure adequate and robust network connections to reach beyond the Smithsonian and allow others to interact with the Digital Smithsonian in a secure manner.
8) Provide technology tools and systems to enable the sharing of our authority (e.g., folksonomy and online discussions), and to tap into the supply of volunteers who would be willing to share their knowledge and energy while being widely dispersed geographically and logistically.
9) Work with data owners to develop and implement an agreed upon registration process for digital science datasets at the Smithsonian (e.g., Digital Object Identification (DOI)) to facilitate the access and use of Smithsonian data.
10) Expand the functionality of the Smithsonian's research repository to link research datasets to published articles in a single reference system.

C-2. Enhance Scientific Computing

Goal: Enhance Scientific Computing

Develop interoperable systems for the long term preservation of Smithsonian science, particularly environmental data and other data which cannot be recreated; and to enable re-use, re-purposing, and e-science through access and discovery tools.

In its report submitted in January 2003, the Science Commission appointed by the Board of Regents recommended that the Institution focus its science resources in the four areas in which it has unique and outstanding research capabilities:

1. The origin and nature of the universe.
2. The formation and evolution of the Earth and similar planets.
3. The discovery and understanding of the diversity of life.
4. The study of human diversity and cultural change.

For the benefit of the scientific community and the public, the Commission also recommended that the Smithsonian:

- Develop the intellectual component of its collections by conducting collections-based studies that enhance existing databases, create new databases, and increase potential uses of the collections;
- Aggressively make use of digitization and Internet technologies to expand the reach of Smithsonian science and make its collections more widely available;
- Support expanded resources for web tools essential to maintaining the quality of its research.

Increasingly, the products of science and the starting point for new research, are digital and most often "born digital." All elements for the pillars of science—observation, experiment, theory, and modeling—are transformed by the continuous cycle of generation, access, and use of ever increasing range and volume of digital data.

Smithsonian climate change research includes measuring atmospheric pollutants and greenhouse gases from space; studying the effects of increasing CO2 gas on Chesapeake plant communities and Florida coastal wetlands; and creating vast, linked observatory networks for measuring climate change impact on flora and

In 2006, the amount of digital information created, captured, and replicated [worldwide] was $1{,}288 \times 10^{18}$ bits.

In computer parlance, that's 161 billion gigabytes. This is about 3 million times the information in all the books ever written.

fauna at our centers in Virginia, Maryland, Florida and Panama and worldwide through collaborations with others. In the North, our anthropologists collaborate with native people to understand their adaptations to increasingly unpredictable weather and shrinking sea ice.

Our strengths in this area and our convening power allowed us to recently organize a symposium on tropical deforestation that received media attention around the world. This exercise was illustrative of the importance of the Smithsonian in generating open debate on matters of importance to scientists and the public alike. Through the long-standing efforts of our scientists, the Smithsonian has been among the leaders in understanding climate change and biodiversity issues. We need to first recognize that these problems are not simple, and that communicating the complex science behind the dynamic processes is difficult, but necessary. Now is the time for the Smithsonian to extend its reach by communicating its research in such a way so that our political leaders and the public can understand it, so that global action can be mobilized to help our planet become more sustainable. This will position the Smithsonian to increase the impact of the remarkable efforts of our scientists.

Objectives during this planning period

1) Develop IT systems and infrastructure in a manner that avoids one-size-fits-all solutions. Scientific data exist in many different types and formats subject to varying legal, cultural, protection, and practical constraints. They are often used in different ways according to their contexts and have varying life cycle requirements. The digital dimension of science is global and require solutions that should support communities of practice while promoting data integration and interoperability.
2) Acquire storage, backup, and disaster recovery solutions to support vast amounts of digital data at the petabyte scale.
3) Plan and implement the migration and data curation expertise for scientific datasets to manage enterprise storage from a variety of storage devices.
4) Continue to partner with the Smithsonian Astrophysical Observatory (SAO) and the Laboratory of Analytical Biology (LAB) on the possibility of using the Smithsonian's Data Center in Herndon to host the storage of data from a new telescope, and a high performance computing cluster.
5) Utilize new, specialized applications, such as geographic information system (GIS) tools, which allow annotation of scientific information with corresponding location data, leading to better and faster interpretation of the material collected.
6) Implement web-based tools to enable collaboration with external and internal partners, as well as when working remotely from the Smithsonian to facilitate research.
7) Upgrade computing capacities in order to improve data collection, management, storage, and distribution, as well as data integration for further value-added analysis.
8) Modernize scientific computing workstations (particularly Suns and Macs).[1]
9) Investigate sources to provide a Smithsonian-wide shared High Performance Computing Cluster.

[1] In FY 2009, the Institution planned to begin replacing scientific workstations on a four-year life cycle under the Institution's Periodic Desktop Hardware Replacement Program; however the program was significantly cut to respond to Institutional budget shortfalls.

10) Provide collaborative training tools for researchers and communities of practice—including citizen scientists.

11) Provide the needed technological support for Smithsonian science unit collaborations with not-for-profit groups in developing large repositories of data.

12) Provide Web-based and New Media tools and mechanisms to facilitate the delivery of Smithsonian research findings to the general public and government bodies in an easily interpretable manner.

The Institution must develop a secure and reliable IT infrastructure in which data can be developed, manipulated, stored, shared, and transformed into knowledge. Without such an infrastructure to protect its digital assets the Institution runs the risk of losing irreplaceable data, becoming less competitive to win grants, and failing to sustain its leadership in the scientific community. To date efforts to obtain Federal funding have been limited, with funds being allocated for a small fraction of the scientific computing requirements.

C-3. Enable Excellence in Education through Technology

Goal: Enable excellence in education through technology

Make our collections, talented scholars and other resources accessible worldwide through technology by providing additional platforms and vehicles for educating and inspiring both large and niche audiences.

The Smithsonian is an important educational institution, providing extensive informal and formal education and training for all ages. Through the use of new technology in education, we will reach new generations in the medium with which they voluntarily engage in daily, and make it easier for them to reach us.

- The social networks that did not exist until recently (blogs, twitter, YouTube, Wikipedia, podcasts, and Web cams) are increasingly becoming a primary agent for communicating directly with students, educators, and life-long learners in two-way and group conversations.

- Handheld devices continue to transform the method and frequency of how people get information making it a seamless aspect of their life. Today, people of all ages routinely carry and interact from cell phones to BlackBerrys to IPods. The Smithsonian must leverage these devices, and emerging devices, as cost-effective platforms for delivering Smithsonian content.

- Educational gaming provides tremendous potential for extending the educational mission of the Smithsonian through games being served from its public websites. Games tap into students' intrinsic motivations to challenge themselves, master new skills, and learn new concepts especially through immersive role-playing virtually. Through games students can scaffold process skills and knowledge that will subsequently be reinforced through more formal instruction. These games have their greatest impact if they are ones that students engage with under their own initiative, and if they are situated firmly within the informal space. It is nevertheless possible to create support materials that will enable teachers or parents to build off the students' game play experiences to supplement classroom or after-school learning. The greatest target of opportunity is for K-12 students, though thoughtfully designed games can work for older players as well.

Facilitating the diffusion of skills and knowledge necessary to benefit from the digital dimension is essential to achieving our strategic vision, and must be integral to all educational activities.

Objectives during this planning period

1) Deliver the means to use new technologies to drive educational and outreach opportunities through the Web.
2) Provide collaborative training tools for educators and communities of learning.
3) Provide online resources for educators and students to investigate and learn from collections and interactions with Smithsonian staff.
4) Provide computer games and interactive exhibits for kids and families.
5) Develop a common Smithsonian Educational Portal with a web-enabled portal that enables customers to find, view, and register online for the universe of educational and public programs offered at the Smithsonian. View or download the accompanying pre- or post-visit resources, locate information about any exhibits or collections which may relate to the program and evaluate their customer experiences through rate-your-visit type applications and formal evaluation methods.

C-4. Enable a World Class Web Presence

Goal: Enable a World Class Web Presence

Enable the Smithsonian to be available to all Americans using technological innovations to establish life-long relationships as an authoritative virtual presence.

The Smithsonian seeks to create an authoritative virtual presence where educators, researchers, and the public come together to appreciate, explore, and interact on topics of art, culture, history and science. With a world-class Web presence the Institution can achieve its strategic objective of sharing Smithsonian resources with large and diverse global audiences, and inspiring students throughout the world.

Even though the Smithsonian websites continue to earn awards and gain recognition for their content, this was the first year in which we experienced a decrease in the number of Web visitors across our sites. The number of virtual visits for FY 2008 was 173 million as compared to 184 million last year (overall 5.6% decrease); page view totals also decreased from 829 million to 752 million (overall 9.23% page views decrease). In spite of these decreases, we saw tremendous increase in traffic related to collection orientated sites in FY 2008 such as:

- 10% increase in visits to the Institution's SIRIS online catalog;
- 60% increase in visits to the National Postal Museum's Arago website;
- 60% increase in visits to the Smithsonian Photography Initiative website;
- 339% increase in visits to National Air and Space Museum's eMuseum collection site.

We experienced organic growth on the Web for a decade with little or no coordination among our sites on the strength of our name and content. The social networking phenomenon is turning our consumers into producers. They now spend significant online time socializing and producing content. It's a new paradigm and we have to build new IT delivery mechanisms in order to increase our relevancy. Visitors to our websites will increasingly want to do their own interpretation and engage our experts, rather than simply seeing the objects that tell the narratives we chose to explore. The Institution launched a web strategy initiative in FY 2009 to allow us to understand and adapt to these dynamic changes in a rapidly evolving environment, and also directly engaged digerati[2] in a Smithsonian 2.0 conference to further understand this shifting dynamic.

[2] Digerati -- Opinion leaders who, through their writings and activities, promote a vision of digital technology and the Internet as a transformational element in society.

FY 2009-FY 2014

Objectives during this planning period

1) Participate in developing and implementing a Smithsonian-wide strategy for how the Smithsonian can become a world-class Web presence fostering lifelong relationships with visitors and creating a global community.
2) Reinvent the Smithsonian's central website (si.edu) in order to present a more appealing and navigable website for all ages; and no longer require Web visitors to understand the organizational structure of the Smithsonian to find the information.
3) Develop additional service mechanisms to assist units with the delivery of Smithsonian content leveraging Web 2.0 and Web 3.0 capabilities.
4) Develop the necessary tools to search and explore the Smithsonian's vast repositories of knowledge, as well as share their knowledge as participants in the Smithsonian experience.
5) Develop formal relationships and pan-Institutional efforts to deliver our digital content to social networking sites where our online visitors choose to go rather than force them to come to us first.
6) Create the enabling technological means to welcome millions of visitors of varying ages, learning styles, first languages, and cultural backgrounds through the Smithsonian's Web presence.
7) Provide shared services for unit webmasters to enable and support the Smithsonian's Web presence at reduced unit cost.
8) Partner with units to conduct experiments and pilots of emerging technologies; and when successful, assist with scaling them for Smithsonian-wide implementation and sharing these innovations with other institutions.
9) Improve Web visitor analysis to better understand and engage our visitor to increase visitor loyalty and satisfaction.

C-5. Enable Excellence through Management Systems

Goal: Enable Excellence through Management Systems

Provide Smithsonian staff with the systems, and access to the information contained within, that enable them to perform their jobs and support the advancement of the Smithsonian mission while ensuring resources are wisely managed in a manner that reflects the Smithsonian's status as a public trust.

The Institution will continue to implement *PeopleSoft* Enterprise Resource Planning (ERP) system and the Facilities Management System; and will continue to identify and implement other commercial software products through FY 2014 in order to meet its financial, human resources, facilities, security, records management, physical management, and other management needs. During this planning period we will also continue to focus on upgrading the ERP Financials, HRMS, and Facility Management systems to the latest releases to enable access to the latest functionality and continued support from the commercial software vendors. The upgraded versions provide the platform necessary to support the objectives for this planning period.

Objectives during this planning period

1) Complete the automation of the processing of transactions between the Institution and our banking partners.
2) Convert cost-benefit analysis on support for shared service providers for HRMS and payroll processing.
3) Enhance and expand the Financials and HRMS ERP systems to expand support for managing projects, grants and contracts, reporting, and to replace additional legacy systems.
4) Evolve the ERP Financials to support emerging Federal financial requirements.
5) Implement handheld technology with Facilities Management System applications.
6) Provide self-service functionality for Facilities Management Services Smithsonian-wide.
7) Evaluate the use of enterprise e-commerce systems to support the needs of Smithsonian units.
8) Implement a shared membership and contact management system.

9) Implement a secure donor management system to support the needs of the Office of Development and units for fund raising, in particular the National Fundraising Campaign, integrated with the Institution's ERP system.

10) Expand the Smithsonian Online Academic Appointment (SOLAA) system to include fellows.

11) Define the requirement for and implement a pan-Institutional electronic records management system.

12) Improve the Smithsonian's Intranet to increase staff collaboration, and improve workflow to better reflect how staff access and share information internally.

C-6. Maintain a Robust and Scalable IT Infrastructure

GOAL: Maintain a Robust and Scalable IT Infrastructure

Apply an enterprise approach to managing the Smithsonian's IT infrastructure centrally to create a standards-based IT infrastructure as the foundation for robust and scalable distributed systems and services that support applications throughout the Institution.

The programmatic systems— collections, scientific research, education, exhibitions, outreach, and administrative—represent the primary automation support provided to Smithsonian museum, research, and education missions. The IT infrastructure encompasses the deployed foundation hardware, voice and data communications, system software, and distributed computing framework software linked together through the Smithsonian network (SInet). The Institution-wide communications network provides comprehensive end-to-end data transmission linking servers, shared printers, and workstations. SInet provides services to more than 6,000 end-users along with access to administrative and program applications and databases throughout the Smithsonian.

Objectives during this planning period

1) Maintain and grow the IT infrastructure to meet emerging mission needs—particularly in the area of enterprise storage, backup, and disaster recovery systems, as well as network connectivity and bandwidth.

2) Expand the common-standards-based IT infrastructure to meet commodity service needs in a secure and scalable manner.

3) Consolidate commodity services and databases in use across the Institution to achieve economies of scale, facilitate the sharing of information, increase supportability, and increase the capacity for data transmission in a complex heterogeneous network mix of wireless, broadband and Ethernet transport methods;

4) Regularly replace IT infrastructure components on an industry best practice replacement cycle in accordance with the evolving Smithsonian-wide IT enterprise architecture.

5) Leverage emerging technologies for providing services such as Software as a Service (SaaS), Cloud computing / storage, virtualization of servers, and Web 2.0 and 3.0 participatory services.

C-7. Provide Telecommunication and IT Services for a Mobile and Remote Workforce

GOAL: Provide Telecommunication and IT Services for a Mobile and Remote Workforce

Provide mobile and remote access technologies and services to support staff whose duties require them to work away from the traditional desk environment.

Smithsonian staff need to be able to talk on the phone, receive and send email, access the Internet, and connect to the Smithsonian network remotely whether when working from home or half-the-way around the world. In the past several years:

- The Blackberry with its access to Smithsonian email has gone from a novelty to a mission critical communication device.
- The Smithsonian Washington DC offices are no longer concentrated near the National Mall as offices have been relocated to less expensive office space in the Virginia and Maryland suburbs requiring technology solutions to bridge the distance between coworkers.
- Smithsonian staff are requiring handheld devices accessing a secure wireless network to perform their duties onsite whether it is facilities, collections management, or uploading fresh content to a Smithsonian Web presence.

These demands will continue to increase and the Office of the Chief Information Officer will need to continue to find cost effective secure ways to either provide the services and equipment, or to negotiate cost effective service agreements funded through unit budgets.

Objectives during this planning period

1) Continue to identify methods to satisfy mobile computing and telecommunication requirements.

2) Establish pan-Institutional support for multimedia (videoconferencing, webcasting, podcasts).

3) Deliver services to Smithsonian staff in a manner which is more conducive to the expectations of Millennials[3] who are now joining the Smithsonian as staff, students, and fellows.
4) Expand the secure wireless network to provide increased coverage in both public and staff-only spaces.
5) Increase staff's remote access to the Smithsonian network, services, and the information contained within.

C-8. Provide Optimized IT Services

GOAL: Provide Optimized IT Services

Continuously re-evaluate and adjust the delivery of IT services across the Institution to increase user satisfaction, reduce costs, and achieve a balance between centralized and de-centralized services.

The Smithsonian operates most of its IT infrastructure on a centralized basis while many IT end-user support functions and application server operations are performed by its units. The central IT service organization within the Office of the Chief Information Officer provides network and data center services, help desk services, desktop support, and web-hosting services; and limited application development and maintenance support.

Several of the larger Smithsonian units operate their own application servers and provide desktop and help desk services. Web content and collections information systems are usually managed directly by each unit.

Objectives during this planning period

1) Identify methods to satisfy IT requirements with decreased financial and environmental costs—such as through negotiated pan-Institutional contracts.
2) Perform IT skills assessments of OCIO and unit staff on a regular basis to understand the variety and level of development of current IT skills, to identify new skill requirements, and to develop plans to enhance or to acquire the skills needed to support the Institution.
3) Partner with other Smithsonian units to create centers of excellence for Smithsonian-wide IT implementations that do not necessarily have to reside in OCIO.
4) Implement additional analytical tools to better measure and interpret system performance.

[3] Millennials – The generation born between 1980 and 2000 who grew up with technology as an ingrained part of their daily life. They tend to work in a social and collaborative manner, and will want the same level of access to technology tools that allow them to remain and leverage their social networks virtually at work as they do in their personal life.

5) Improve capacity planning for enterprise storage and backup requirements.

C-9. Improve IT Security Balanced Against Mission Needs

The Institution needs to increase IT security services to protect public information system portals,

GOAL: Improve IT security balanced against mission needs

Broaden the scope of the Smithsonian's IT security program beyond IT operational controls in support of a more balanced enterprise program.

internal communications infrastructure and increase support for securing general support systems as well as for major and associated minor applications. This vision is not meant to impede requirements for rapid innovation; but risk is assumed when IT security/ privacy questions are delayed because security and privacy requirements are not well understood and/or are not adequately resourced.

As the Smithsonian's presence on the global Web continues to expand, the Smithsonian cannot afford to address IT security issues as afterthoughts. If systems and applications are not fully secured prior to moving into production or new technologies are fielded without adequate security or staff support, an increased risk of a security/privacy compromise is being accepted by the enterprise, not just by the mission or system sponsor.

Over the past five years, the OCIO has made significant progress in provisioning operational controls, particularly for the Security Operations Center (SOC) and IT infrastructure / perimeter defenses and security tool support. Over the next five years, the Smithsonian vision for a more balanced enterprise IT security will require additional IT security staff, particularly in the units.

Objectives during this planning period

1) Strengthen internal security controls beyond perimeter defenses for balanced increased access to collections supporting history, art, culture, and science with collaborative communities while minimizing the associated IT security risks.
2) Regularly review and update Smithsonian IT Security directives which establish high-level policies; and technical standards and guidelines which establish best practices and procedures.
3) Increase staffs understanding and reliance on internal IT security controls in reducing IT security risks while assuring we can safely deploy new technologies and new applications.
4) Strive to meet new security requirements such as remote authentication, and full laptop encryption within current resource levels.

While the Institution has made significant progress in its IT Security Program, the *FY 2006 Audit of the Smithsonian Institution Security Program* by the Smithsonian's OIG is still valid in stating that "without the centralization of IT operations and the assignment of responsibility within OCIO for ensuring Institution policies and procedures are being followed, management cannot ensure adequate controls are in place."

D. Planning Process

D-1 Assumptions & Constraints

Information technology planning decisions are influenced by the strategic vision and goals for the Institution, as well as by program, social, political, economic, demographic, and technology issues. The following assumptions and constraints are of note.

Program

- Resources will be focused on initiatives that support the Institution's goals.
- The public will increase its demand for visitor information and for access to collections, exhibitions, and research data in a participatory manner.
- The Smithsonian will be required to provide to the public increased transparency into its operations and processes via the Internet.

Economic

- Funds available during the planning period for IT initiatives will be far less than the demand for them; and we must engage non-Federal funding sources to meet these emerging needs.
- Recruiting and retaining highly skilled workforce who can address emerging IT customer needs will be a continuing challenge.

Technology

- Required information technology skills, knowledge, and abilities will increasingly transition to more complex, online, interactive, web-based systems.
- New technologies can significantly improve the productivity of existing operations.
- New technology will continue to evolve and enable users to have faster access to more timely data, which will trigger demands for new uses of IT to help manage programs and provide new services.
- Commercial software products can satisfy most Smithsonian application needs—the exception being research computing where locally developed applications for data reduction, modeling, and analysis will continue to be needed.
- Access to Smithsonian information using mobile technology will continue to increase.
- Network bandwidth demands will continue to increase.

These assumptions and constraints impose conflicting demands on the IT initiatives of the Institution. While increased demand for more and better IT support will continue, pressure to reduce IT expenditures in spite of emerging needs and the development of a digital Smithsonian will also continue. However, adequate funding, adequate storage, and a highly skilled IT staff are essential to maintaining current business practices and implementing the Institution's plans for improving its business processes and public services.

D-2. IT Capital Planning & Investment Control

To improve Institutional planning, budgeting, and performance management, the Smithsonian has integrated IT planning with overall planning and budget formulation activities. In support of these efforts, the Office of the Chief Information Officer (OCIO) has initiated a year-round perspective on IT planning and budget formulation through the use of tools such as IT strategy and in-process reviews that:

- Support the goals and objectives of the program areas;
- Integrate requirements across the Smithsonian;
- Increase user involvement;
- Link IT planning to overall Institutional processes.

IT plans and budgets need to be linked to the strategy, goals, and objectives for the Institution. Progress in executing the strategy is evaluated with program area performance measures are to: (1) develop plans that reflect resources available to accomplish missions and goals; and, (2) provide measurable indicators of results. Units must work closely with IT support staff to identify and prioritize projects.

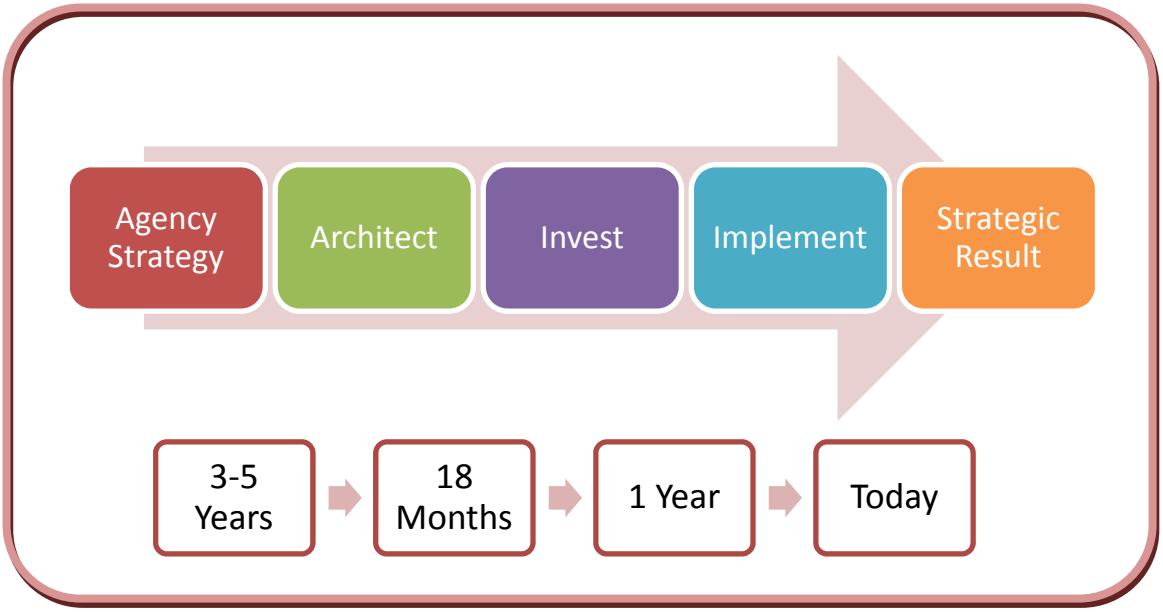


Figure 2: IT Planning Process & Timeline

The Smithsonian has implemented the following four-stage iterative approach for information technology planning, budgeting, and performance management.

1. **Plan [Strategy/Architect]**—define Institutional and program area IT strategies, the framework of the planning process.

2. **Select [Invest]**—Capital Planning Board selects IT projects for inclusion in the investment portfolio.

3. **Control [Implement]**—the Technical Review Board monitors interim results of IT projects and takes action as necessary to ensure achievement of benefits through the life cycle management process.

4. **Evaluate [Strategic Result] —**assess results of each major IT project by conducting post-implementation reviews to determine whether the system delivered what was expected.

The Smithsonian is required to report, via OMB-300, how the major IT investment satisfies federal security and privacy requirements. In making funding decisions, OMB assesses how well security/privacy details of the investment are documented and budgeted for the proposed investment life cycle. Starting in FY 2010, the Smithsonian is planning to increase visibility for ensuring the Capital Planning Board (CPB) requires systems budgets to more clearly identify support for IT Security and Privacy Controls. IT security/privacy costs are expected to include:

- Design and implementation of required Management, Operational, and Technical security controls based on NIST SP 800-53;
- Creating and Updating System Certification and Accreditation (C&A) artifacts and documents;
- Independent Security Assessment Reports (SAR);
- Plans of actions and milestones (POA&Ms);
- Contingency / Disaster Recovery planning and testing;
- Continuous Monitoring Controls (e.g. Security log file reviews, account management, incident reporting, etc.).

Security costs may also include the products, procedures, and personnel (Federal employees and contractors) to support IT security controls (e.g., support for the system configuration management /change control process, personnel security, user account management, privacy safeguards, etc.). New unit and OCIO IT investments must initially identify adequate IT security/ privacy costs in their system acquisition plans.

D-3. Plan

In February, the Chief Information Officer (CIO) typically reviews the Institution's IT strategies and outlined goals, initiatives, and activities for achieving Smithsonian commitments. The primary drivers for IT planning include the following objectives:

- Maintain a robust, reliable, and secure IT infrastructure;
- Enhance financial, human resources, and facilities systems;
- Establish a digital infrastructure needed to preserve and leverage digital assets;
- Enhance scientific computing;
- Consolidate application servers and commodity IT resources;
- Establish a world-class web presence.

The CIO works closely with the Chief Financial Officer (CFO) to implement an Institution-wide IT planning process that supports strategic objectives, integrates requirements across the organization, and ties closely to the budget formulation process. The Director of the Office of Planning, Management & Budget (OPMB), who reports to the CFO, issues planning guidance for the budget formulation process including specific information related to IT initiatives. In the spring,

the Capital Planning Board meets to discuss priorities for IT investments to be considered in the upcoming Federal budget request. The CIO presents the portfolio of IT projects by program area: collections, finance and administration, scientific research, IT infrastructure, and public Web, education, and outreach.

For the FY 2010 budget cycle an increase of more than $21 million was needed to meet all submitted IT requirements, either new or expanding. The CIO proposed the following prioritization scheme which was adopted by the Capital Planning Board:

1. Maintenance of current day-to-day IT support and service levels
2. Digitization support
3. Web support
4. OMB or NAPA[4]-Driven Projects
5. Enterprise solutions benefiting multiple units
6. Scientific computing support

The IT budget requests were subsequently mapped against the Regents' priorities for the Institution of: non-discretionary costs which include mandatory hardware and software system maintenance and licenses; stewardship of National collections; increased diffusion of knowledge; governance and management operations; and new museum support.

D-4. Select

The Capital Planning Board meets to review the proposed IT initiatives, prioritize them for inclusion in the budget request. For the FY 2010 budget request, the Budget Committee approved an overall increase of $12.4 million which was incorporated in the Smithsonian's FY 2010 budget request submitted to the Office of Management and Budget (OMB) in September 2008 for informational purposes given that it was a Presidential election year.

The Institution subsequently received the budget passback from OMB only funding the mandatory increases for $1.613 million, and the Smithsonian submitted an appeal. For this budget cycle there were two passbacks. OMB's response to the appeal the second time provided an additional increase of $2 million for digitization and Web support for enterprise solutions. The total budget increase approved for FY 2010 is $3.613 million plus pay increases.

D-5. Control

The Smithsonian has established formal mechanisms through the automated information system (AIS) and IT infrastructure life cycle management (LCM) process to monitor interim results of IT projects and take corrective action when needed. These mechanisms provide visibility into IT projects and establish management control points for assessing project cost, schedule, and quality.

Project plans are developed to support major projects identified in the *Smithsonian Information Technology Plan*. They contain the greatest level of detail on day-to-day requirements for achieving the scope and objectives of the Institution's IT program. They also contain specifics on system development life cycle (SDLC) tasks such as design, development, training, testing, telecommunications, facilities, implementation, disaster recovery support, and other activities

[4] NAPA – National Academy of Public Administration

affecting the transition of projects from initiation through system operation. They also identify IT Security Architecture / Standard for IT Security Requirements, IT Security artifacts and deliverables required for systems to obtain accreditation and an Authority to Operate (ATO) in the Smithsonian's production environment.

The Smithsonian's Technical Review Board (TRB) reviews major IT projects to ensure that they are progressing on schedule within budget and satisfying stated needs. These reviews assess projects with an eye towards:

- Improving the quality of intermediate work products, correcting defects as early in the life cycle as possible, and preventing long-term problems.
- Ensuring that the IT system being produced can be supported by the current and planned IT infrastructure.
- Ensuring that the projects conform to system development methodology and supporting tools, standard data, and adhere to the Institution's Technical Reference Model (TRM).
- Monitoring the impact of a project on other automated systems, related projects, and the IT infrastructure.
- Optimizing IT Security, by conforming to the Smithsonian's IT Security Architecture and standards, and ensuring that IT security controls and risks are understood prior to moving to a production environment.

The CIO also conducts in-process reviews of cost, schedule, and deliverables for major IT projects. The project management control system tracks schedules and performance against project plans in order to help managers identify problem areas and take corrective actions when actual results deviate significantly from plans.

D-6. Evaluate

The key to evaluating IT projects is identifying performance measures for determining whether the system delivered what was expected. The SDLC management process at the Institution requires that performance measures be identified during the concept phase of the life cycle and that post-implementation reviews be conducted during the operational phase to determine whether those objectives have been and continue to be achieved.

IT performance measures fall into two categories. First, program-area-related measures are considered when making investment decisions. Second, measures associated with operational performance of the IT system or infrastructure component are identified for the production environment. The operational performance measures become service standards that are incorporated into service-level agreements, operational support plans, or the customer service handbook.

D-7. Key Stakeholders

IT policy at the Smithsonian centralizes program-related IT planning, technical direction, oversight, policy formulation, acquisition, and day-to-day operational management of the Smithsonian Institution network and portions of the IT infrastructure under the Chief Information Officer. Some individual Smithsonian units develop and operate specialized automated information systems, and provide desktop support services.

IT Committees & Boards

In support of the IT planning efforts, the Office of the Chief Information Officer has initiated a year-round perspective on IT planning and budget formulation through the use of tools such as IT strategy and in-process reviews, implementation of project management and control processes, and coordination of planning and budget activities. Institution-wide committees and boards involved in IT planning and oversight include:

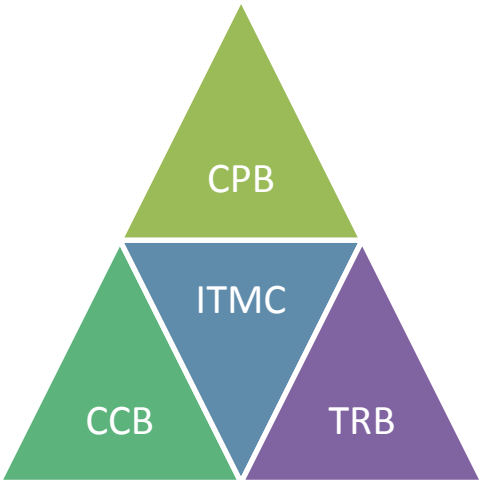


Figure 3: IT Planning & Oversight Committees

- The **Capital Planning Board (CPB)** provides strategic direction and sets priorities for all capital programs—including all major information technology projects.

- The **Information Technology Management Committee (ITMC)** advises and assists the Chief Information Officer (CIO) in establishing and implementing IT management policies, procedures, practices, and enterprise architecture, as well as standards governing the IT infrastructure and IT security—including the acquisition, development, maintenance, and operation of the Smithsonian's automated information systems.

- The **Technical Review Board (TRB)** evaluates the progress of each major IT project and assesses the quality of project deliverables. Its primary objectives are to: (1) improve the overall level of project success, system quality, and productivity; (2) ensure that risks are managed at an acceptable level by completing assessments and IT Security artifacts and deliverables at key project milestones.

- The **Change Control Board (CCB)** reviews requests for hardware and software changes to the IT infrastructure. In considering the potential impact of proposed changes on production schedules, the CCB verifies that users will receive appropriate notification, suggests changes in timing to reduce disruption in work or conflicts in schedules, and denies requests that may have negative effects on day-to-day IT operations or justified increases in IT security risks.

This Institutional perspective allows new technology to be introduced and fosters consistency throughout the Smithsonian by standardizing hardware, software, data, and IT security.

Consistency will be implemented to the extent required to balance the benefits of reduced IT costs and enhanced technical capability associated with a homogeneous IT infrastructure, against the heterogeneity required to meet unique objectives and ensure responsive support. The framework also provides the flexibility needed to encourage innovation, while ensuring that new capabilities can be expanded easily beyond a developer's desktop and supported by the IT infrastructure.

Program Areas

Individual program areas define what needs to be done in terms of IT support functions and their performance goals. Working with a program area sponsor, the CIO identifies how IT can be applied to help achieve desired results, while maintaining efficient and effective IT operations throughout the Institution. The program area sponsor and the CIO also work together to determine project costs and schedules, and to prioritize IT projects and support.

Project Sponsors

The successful development, deployment, and operation of IT systems require close collaboration and partnership between the CIO and IT project sponsors within the program areas of the Institution: finance & administration, museums, libraries, archives, pan-Institutional & National programs; collections; scholarly research; science; and Smithsonian Enterprises.

- The **Secretary of the Smithsonian** determines policies, directs the programs of the Institution, and is responsible for all of its activities.The Secretary is responsibile for approving all IT strategies and initiatives, although he may delegate approval authority to the Capital Planning Board.

- The **Under Secretary for Finance and Administration** has responsibility for Institution-wide support functions including the Office of the Chief Information Officer, Office of the Chief Financial Officer, and the Smithsonian Institution Archives.

    - The **Chief Financial Officer** assists the Secretary and Under Secretaries by providing oversight of the activities of the Office of Planning, Management & Budget, the Office of the Comptroller, the Office of Contracting, and the Treasurer of the Institution.

    - The **Chief Information Officer** assists the Secretary and Under Secretaries in modernizing the Institution's information systems and sets the strategic vision for leveraging IT to help achieve Smithsonian goals and objectives. The CIO directs the:

        - Development, implementation, maintenance, enhancement, and operation of selected automated information systems;
        - Development of strategic and operational information technology plans and operating budgets;
        - Architectural design and acquisition of supporting automated information systems and the underlying IT infrastructure;
        - Operation of the Institution's central computer facilities, equipment, and voice and data networks;
        - Development of the enterprise architecture and IT standards
        - Development of the IT Security Enterprise Program

- The **Under Secretary for History, Art and Culture** has responsibility for the Institution's history, art, and cultural museums, research, public programming and outreach activities; for National Programs that focus on traveling exhibitions, education programs, and affiliations with museums across the country; and the Smithsonian Associates' programs of lectures, performances, classes, and travel that take the Institution beyond the Mall.

- The **Under Secretary for Science** provides oversight and coordination of activities of the Institution's scientific research units and Smithsonian Institution Libraries. Smithsonian Science is engaged in research and discovery focused on understanding the origin and evolution of the universe, earth and planets, life's diversity, and human cultures.

- The **Chief Executive Officer, Smithsonian Enterprises** is responsible for the revenue-generating operations of the Institution. These include restaurants, museum shops, mail order, travel tours, product licensing, and the magazines.

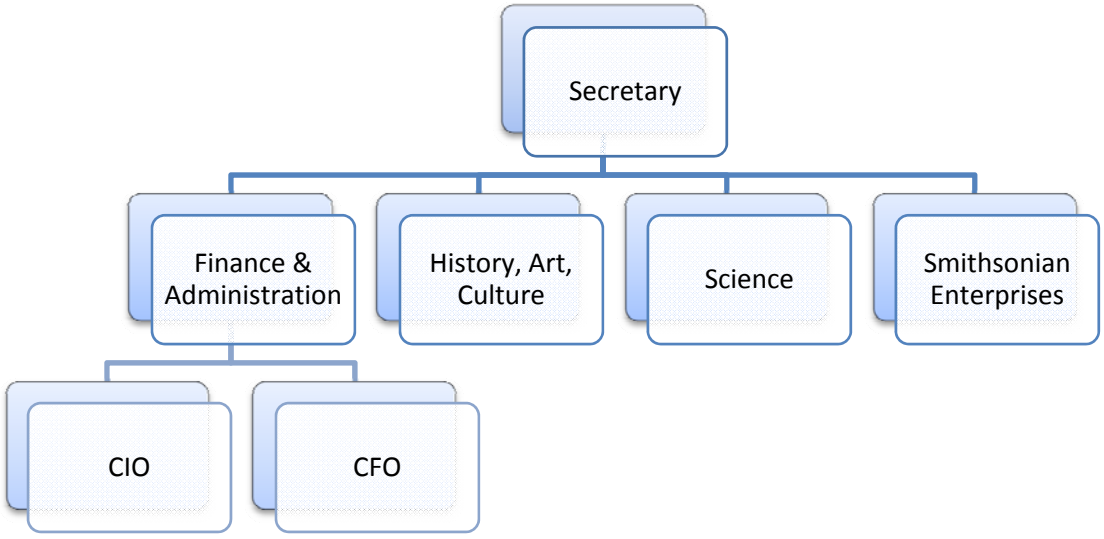


Figure 4: Placement of OCIO & Key Stakeholders

E. Infrastructure Analysis

In early FY 2009, the Institution's Information Technology Management Committee met and developed the Strength, Weakness, Opportunity and Threat (SWOT) Analysis for the Institution's managed IT infrastructure. This analysis informed the development of the FY 2009 SITP Strategic Overview.

Objective 1: Implement a Managed IT Infrastructure	
Strengths	**Weaknesses**
• Server Consolidation • Service Consolidation • VOIP • Help Desk • Mobile Technology • Desktop Replacement • Email/File Services • Backup • Standard Configuration (Desktops and servers) • Virus Scanning • Remote Desktop Management • Data Center Services • Web Infrastructure	• Enterprise Storage Requirements • Enterprise DAM • Data Silos • Collaboration Spaces (Internal and External) • New IT Staff and Skills for the future • Enterprise Backups (keeping pace with storage) • Duplicate Web services across the Institution • Enterprise Electronic Records Management
Opportunities	**Threats**
• Desktop Video Conferencing • Social Networking/Web 2.0 • Mobile Technology/Wireless • Collaborative Space with External Entities (e.g. Sharepoint) • Scientific Data • Web Shared Services (event calendaring, registration, ticketing, e-commerce, etc.) • Software as a Service • Open Source Software • Centralized Printer Management • Distance Learning • Enterprise Electronic Records Management	• Social Networking (storage, security) • Flat Budget • Rapid evolution of file formats and storage media

Objective 2: Establish an Optimal Organization for Providing IT Services	
Strengths	**Weaknesses**
• Existing dedicated IT Staff • Service Consolidation • VOIP • Help Desk • Mobile Technology • Desktop Replacement • Email/File Services • Backup • Standard Configuration (Desktops and servers) • Data Center Services • Decentralized IT Support • Provide custom yet standardized customer service • Address local unique scientific and unit IT needs	• Decentralized IT Execution • Lack of Collaboration Spaces • Depth and breadth of IT Staff • IT Skills for future requirements • Timeliness and execution of new IT contracts
Opportunities	**Threats**
• Training • Standardize position descriptions and titles • Institutional contract vehicles for IT products and services	• Lack of IT funds • Decentralized IT Management & Budget Execution

Objective 3: Improve IT Security	
Strengths	**Weaknesses**
• Computer Security Awareness Training • Centralized Infrastructure Security Controls (WAN, LAN, Wireless VPN, CITRIX, FDCC Workstation Compliance, Physical & Environmental Controls) • Security Operations Center (SOC) & Automated Tools Alerts • Skilled SOC resources supporting IT Infrastructure • Adherence to government security standards on desktops and servers	• Off hour/weekend Security Operations Center (SOC) coverage is limited to on-call support • Duties not adequately segregated • Infrastructure security procedures and security controls documentation • Limited ability to cross-correlate alerts for greater situational awareness
Opportunities	**Threats**
• Payment Card Industry (PCI) Compliance • Shared Web Services and Security • OS / Server hardening • Centralization of IT Security Logs • Security control descriptions in IT Infrastructure Security Plan • Security procedures • Improve management engagement on IT Security	• Complex network architecture, multiple PoPs, multiple trust zones, etc. • Increasing PCI DSS[5] threats with Distributed Units & Outsourced Services • Increasing Web Application Vulnerabilities Increasing COTS software vulnerabilities & requirements to keep patches & versions up to date • Increasing demand for Collaborative Services • Inadequate staffing for areas of New technologies including virtualization and wireless • Increasing usage of Portable Processing Devices • Increasing threats targeting sensitive primary data, e.g. credit cards, Social Security Numbers • Increasing security requirements may impact public accessibility

[5] PCI DSS – Payment Card Industry Data Security Standard

F. Transition Framework

The Office of Management and Budget sponsors and/or endorses cross-agency initiatives in one place for easy reference, review, and assessment relative to their applicability to individual agencies. While the Smithsonian is not an executive branch agency, the Board of Regents recommends that the Institution should follow federal best practices. In this light, e-government and line of business initiatives are evaluated and considered as components of the Smithsonian's enterprise information technology architecture.

Often times the Smithsonian is limited in its participation in that many of these initiatives do not fit the unique requirements of the Smithsonian as a wholly-owned Trust instrumentality of the United States of America, whose mission is for the increase and diffusion of knowledge, versus the traditional government role of providing a defined statutory service to the citizens. In particular the composition of its staff being made up of federal employees, trust employees, and a significant number of volunteers and visiting scholars would result in federal solutions requiring significant customization at increased costs. Funding of Smithsonian efforts extend beyond federal appropriated dollars to include trust revenue, grants, donations, and partnerships which is not typical of most Federal agencies also adds to the complexity.

F-1. E-Government Initiatives

The Smithsonian Institution, as a Trust Instrumentality of the United States, is not subject to the E-Government Act. As stewards of the Trust, Smithsonian management has committed to evaluating each E-Government Initiative and adopting them where it is both feasible and beneficial to the mission of the Institution. In many cases, the initiatives put forth under the E-Government umbrella simply do not apply to or support the business of the Smithsonian. The level of participation in each initiative is further defined in the Smithsonian's Information Technology Plan.

Smithsonian Participation in E-Government Initiatives

Government to Business	Government to Citizen
• Federal Asset Sales	• Recreation One Stop
Government to Government	**E-Authentication**
• E-Vital (minimal)	• HPSD-12
Internal Efficiency & Effectiveness	
• E-Clearance • E-Learning • E-Payroll	• E-Government Travel • Enterprise HR Integration • Integrated Acquisition Environment

F-2. Federal Transition Framework Lines of Business

During the periodic evaluation of existing systems and the planning for new systems, the Federal Transition Framework (FTF) Line of Business initiatives are evaluated as alternative for satisfying the functional requirements in the modernization and enhancement of the Smithsonian's enterprise architecture.

With thoughtful consideration, the Smithsonian has evaluated and continues to monitor the following lines of business: Financial management, human resource management, Geospatial, and IT Infrastructure.

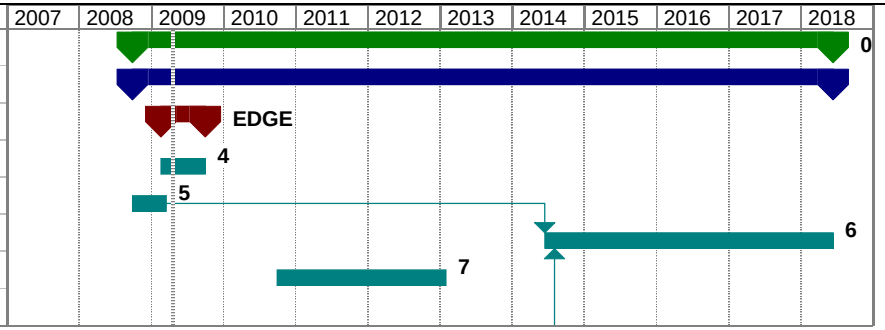
G. Transition and Sequencing Timeline

The following charts summarize key milestones for the FY 2009–FY 2014 planning period organized by enterprise architecture (EA) segments, and links each of them to the Smithsonian's strategic IT initiatives taking into account any dependencies between them and across segments. Enterprise architecture segments are a subset of the entire enterprise architecture based on varying mission areas with the long term goal of implementing shared IT solutions that replace redundant systems with agile enterprise solutions which continuously adapt to meet emerging Institutional requirements. At the Smithsonian we have the following EA segments defined for the planning period. Each segment can have one or more of the Federal EA line of business codes.

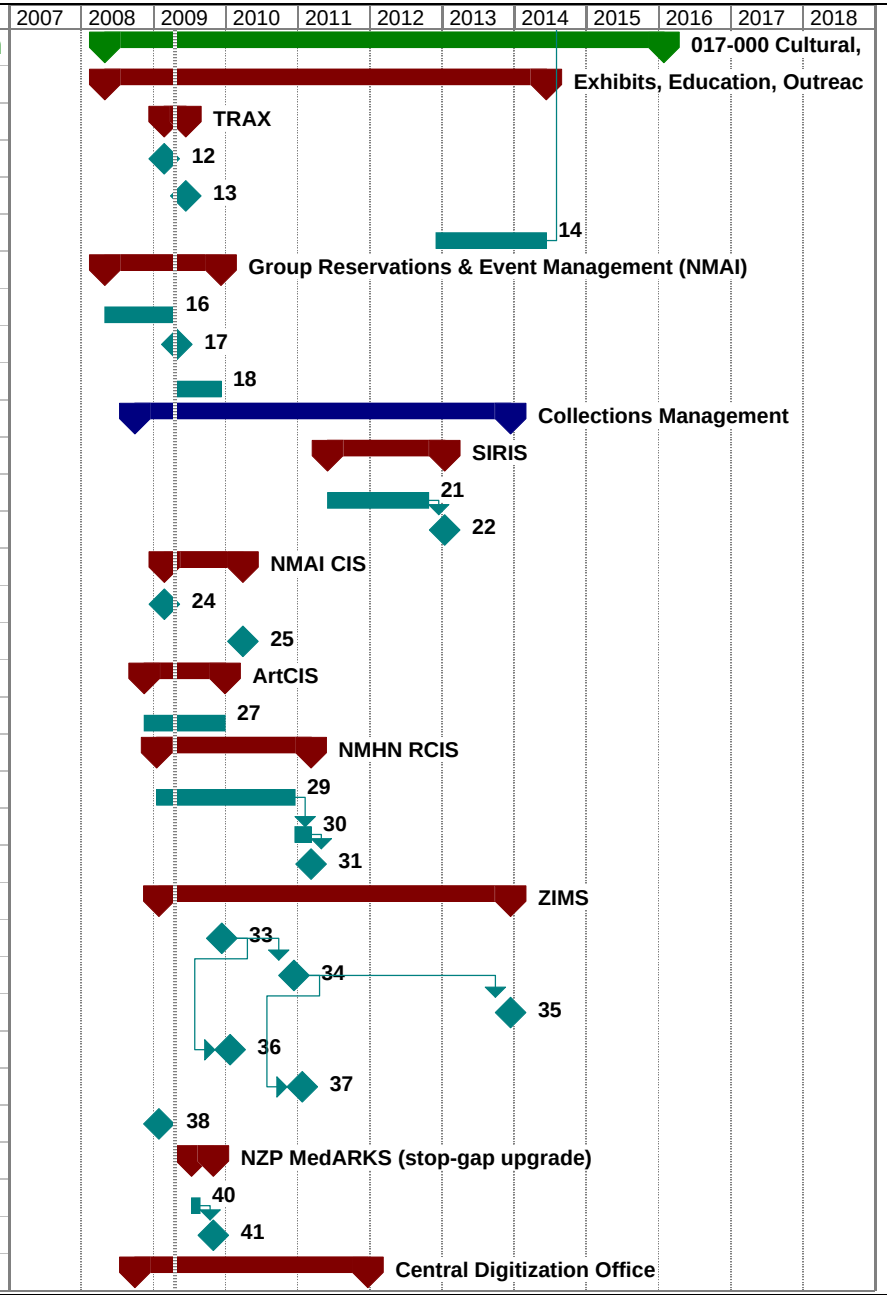
Smithsonian EA Segments

Name	Description	Segment Code
Education	Development, performance and evaluation of Smithsonian Institution educational programs.	015-000
Cultural, Artistic and Historic Preservation & Exhibition	Managing the increase and diffusion of knowledge internally and externally through the development and maintenance of Smithsonian physical and virtual collections and exhibitions.	017-000
IT Management & Planning	Provides the enterprise architecture, strategic Information Technology planning and technology infrastructure services for the Smithsonian Institution	404-000
Facilities & Security	Ensures the safety of Smithsonian staff, collections, property, and visitors.	401-000
Finance and HR	Management of personnel and financial resources across the Institution, including both Federal and Trust funds.	402-000
Scientific Research	Providing the scientific computing infrastructure to support Smithsonian science, and the data curation to meet stewardship responsibilities of this data	109-000

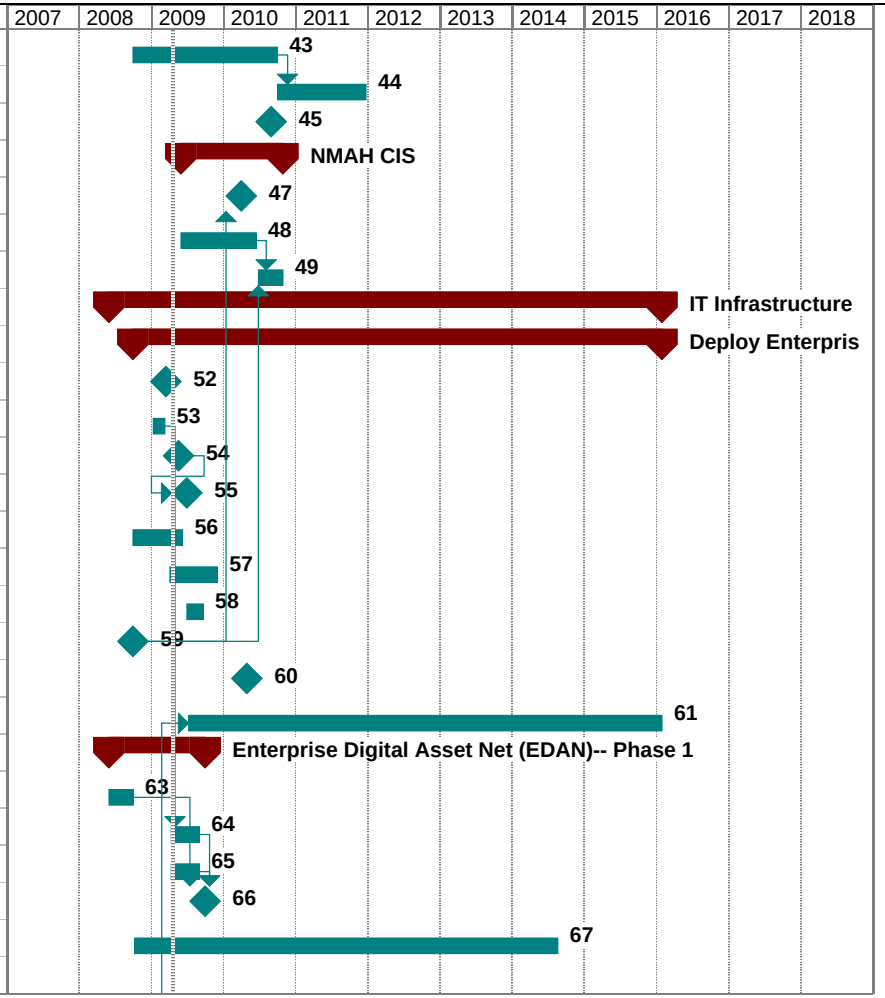
ID	Task Name
1	**015-000 Education Segment**
2	**Exhibits, Education, Outreach & Web**
3	**EDGE**
4	Audience Outcomes
5	**Pan-Institutional Calendaring**
6	**Educational Portal**
7	**Expand SOLAA functionality**
8	



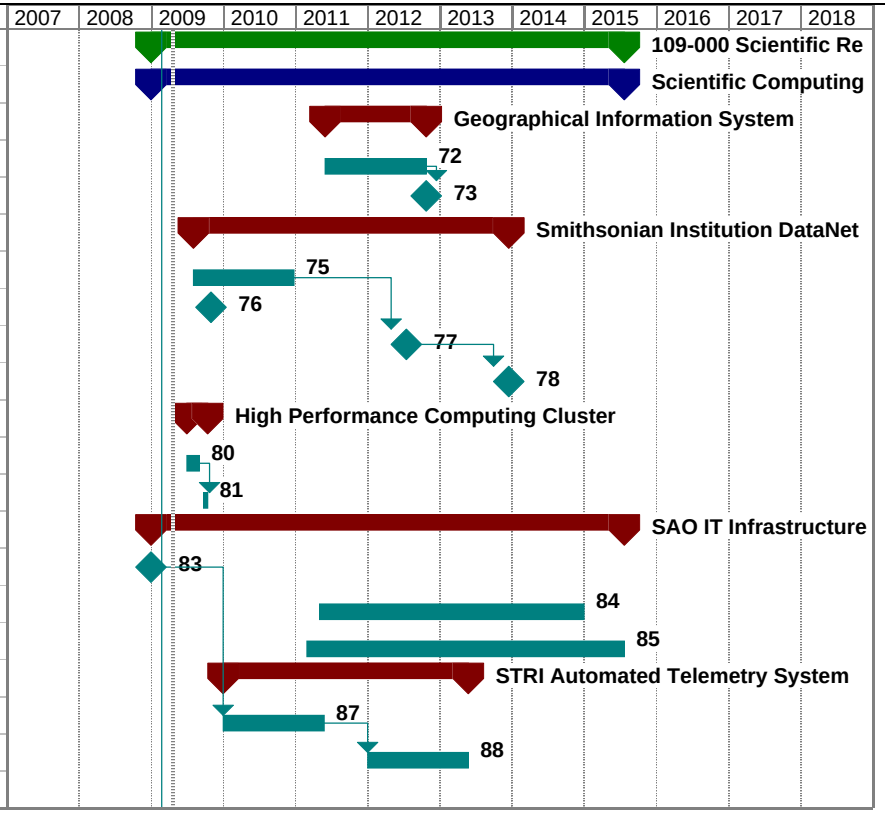
ID	Task Name
9	**017-000 Cultural, Artistic & Historic Preservation and Exhibition Segm**
10	**Exhibits, Education, Outreach & Web**
11	**TRAX**
12	Integrate SITES Poster Shows into TRAX
13	Upgrade TRAX to release 17
14	**Group Reservations & Event Management (SI-wide)**
15	**Group Reservations & Event Management (NMAI)**
16	Phase 3: Expand User Base
17	Implement iEBMS internally
18	Phase 4: Expand User Base
19	**Collections Management**
20	**SIRIS**
21	Acquire New System
22	Deploy SIRIS Replacement
23	**NMAI CIS**
24	Public Web Access
25	Exhibition content for museum initiatives uses CIS
26	**ArtCIS**
27	Integrate into EDAN cross search
28	**NMHN RCIS**
29	Migrate Legacy Databases
30	Combine EMU and TMS
31	Retire TMS
32	**ZIMS**
33	ISIS deploys ZIMS Phase 1: basic animal records
34	ISIS deploys ZIMS Phase 2: animal records enhanced for medical data
35	ISIS deploys ZIMS Phase 3: scientific & conservation research functions
36	Retire ARKS
37	Retire MedARKS
38	Retire SPARKS
39	**NZP MedARKS (stop-gap upgrade)**
40	Data Migration
41	Deploy System
42	**Central Digitization Office**



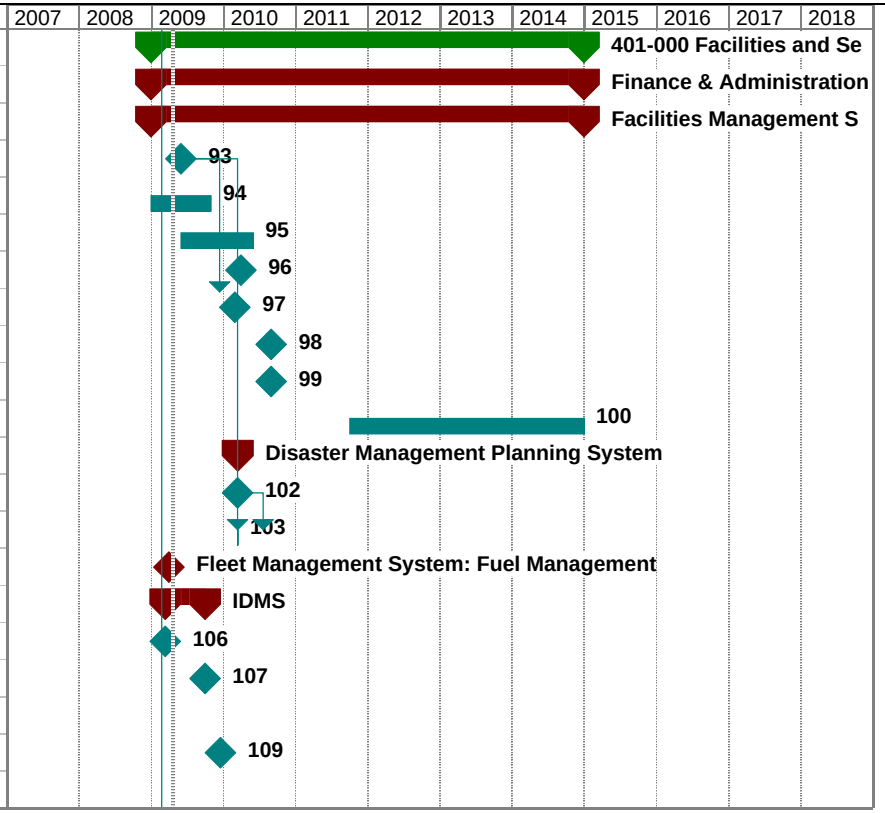
ID	Task Name
43	Establish Office with 2-year detail
44	Digitization Strategic Plan
45	Permanent Office Staffing
46	**NMAH CIS**
47	Bridge SI DAM and MIMSY XG
48	Metadata Cleanup for Enterprise DAM, 2 TB
49	Migrate files to SI DAM
50	**IT Infrastructure**
51	**Deploy Enterprise DAM**
52	Artesia 6.8 SP 2 Upgrade
53	Modifications to support EDAN IDS development
54	Upgrade production server
55	Consolidate NMAI DAMS server
56	Clean-up Pilot Data
57	Metadata & Vocabulary Definitions
58	Defined DAMS Enterprise Architecture
59	Deploy Enterprise-wide (storage restricted)
60	Artesia 7.x Upgrade
61	Expand number of digital assets / units in the DAM
62	**Enterprise Digital Asset Net (EDAN)-- Phase 1**
63	Metadata Model
64	Image Delivery Service
65	Solr/Lucene Cross Search Capability
66	Deploy EDAN
67	**EDAN -- Continue Phased Development**
68	



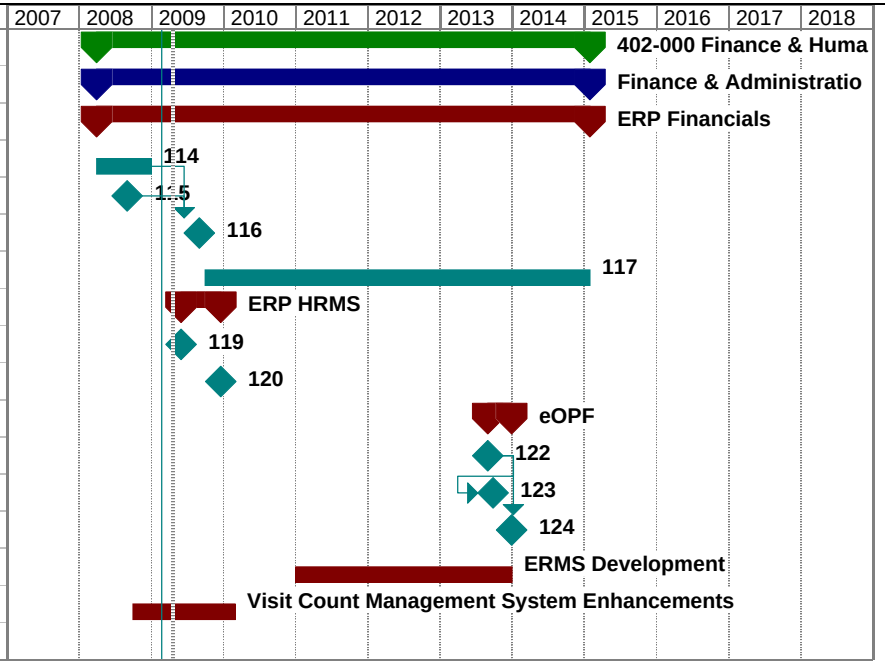
ID	Task Name
69	**109-000 Scientific Research Segment**
70	**Scientific Computing**
71	**Geographical Information System**
72	Integrated Implementation
73	Retire Stand-Alone Implementations
74	**Smithsonian Institution DataNet**
75	Archival Storage (Science)
76	Migrate Data Sets with minimal metadata
77	Mirrored Site
78	Implement Trusted Digital Repository Policies & Procedures
79	**High Performance Computing Cluster**
80	Relocate SOA Hydra HPCC to Smithsonian Data Center
81	Expand Hydra to 14 blades
82	**SAO IT Infrastructure**
83	5-yr replacement cycle for switches and routers
84	4-year replacement cycle for file and compute servers
85	Large-scale network storage upgrade
86	**STRI Automated Telemetry System**
87	Phase 3
88	Phase 4
89	



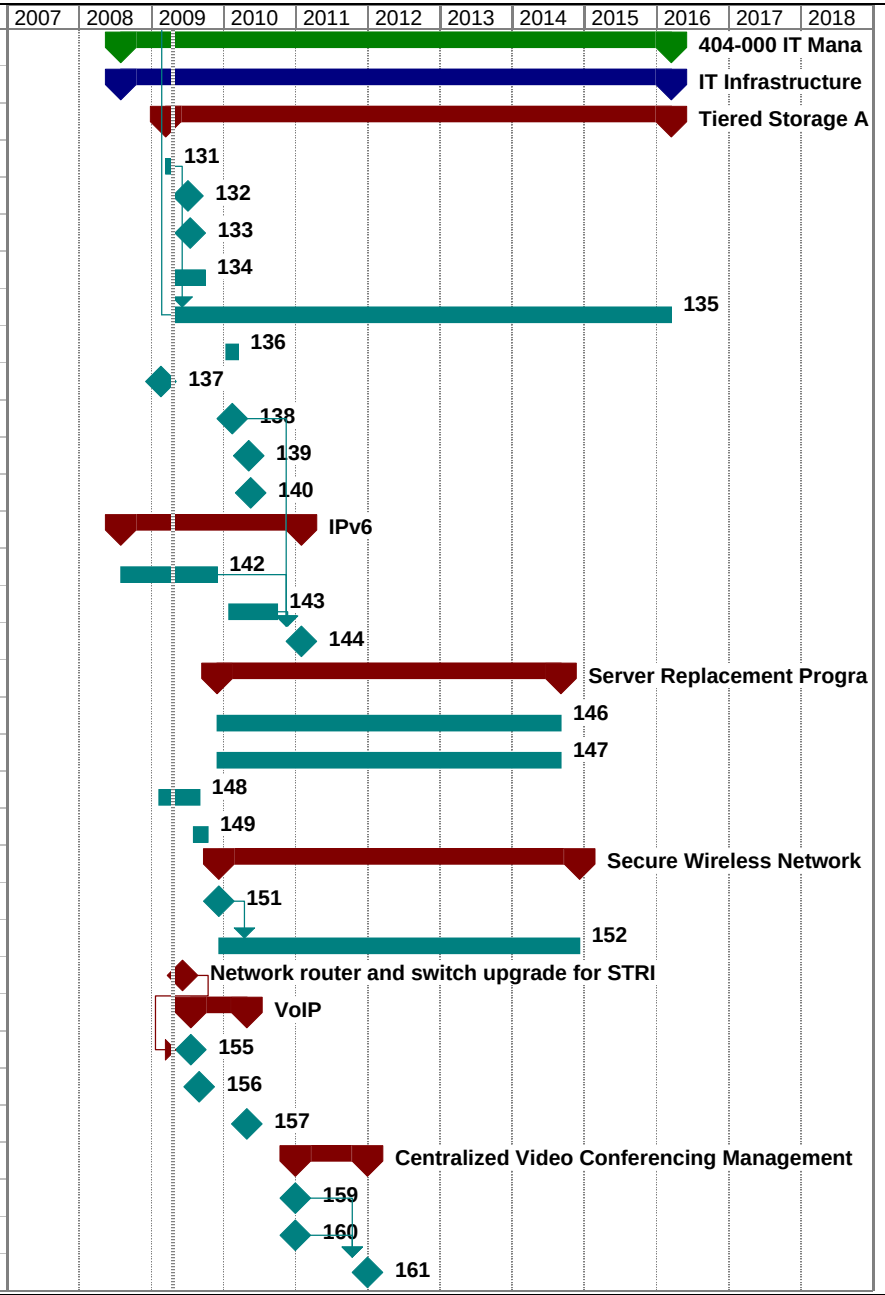
ID	Task Name
90	**401-000 Facilities and Security Segment**
91	**Finance & Administration**
92	**Facilities Management System**
93	Implement Hazardous Materials
94	Upgrade to Tririga 9i
95	Handheld Device
96	Implement Move Management Module
97	GIS Integration with Hazardous Materials
98	Implement Data Warehousing
99	Integrate Energy System
100	Continue to Enhance & Expand Functionality
101	**Disaster Management Planning System**
102	Deploy DMPS
103	Integrate PMPS with FMS
104	**Fleet Management System: Fuel Management**
105	**IDMS**
106	Implement New IDMS & scanning systems
107	Interface IDMS with ERP HR
108	**SIRS**
109	Implement Dispatch Log
110	



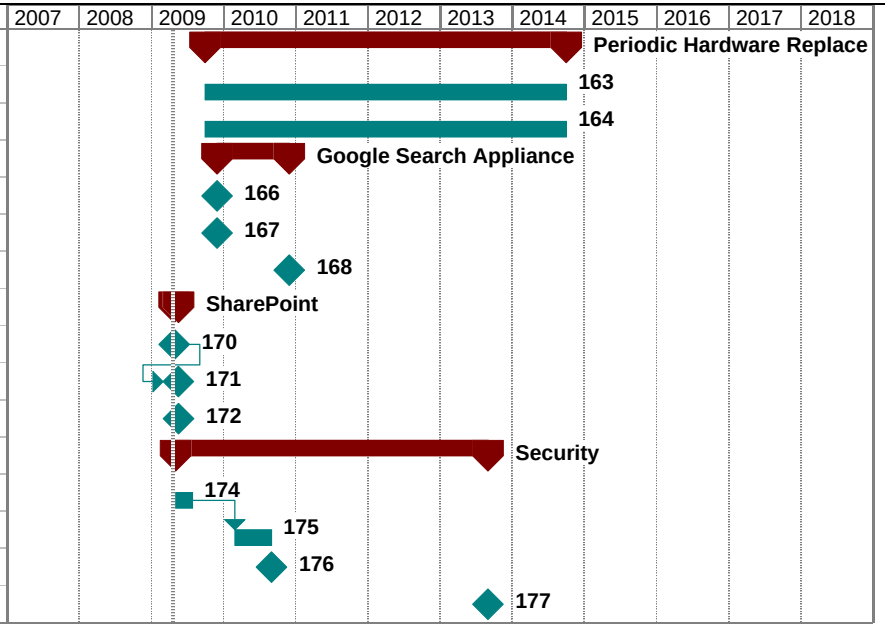
ID	Task Name
111	**402-000 Finance & Human Resources Segment**
112	**Finance & Administration**
113	**ERP Financials**
114	Upgrade
115	Deploy Time & Labor Front End
116	Deploy Time & Labor Back End
117	Continue to enhance and expand functionality
118	**ERP HRMS**
119	Deploy pilot for automated workflow for Performance Management
120	Deploy 9.0 PeopleSoft HRMS
121	**eOPF**
122	eOPF Operational
123	Interface eOPF with Retirement Management System
124	Retire Accu-Trax
125	**ERMS Development**
126	**Visit Count Management System Enhancements**
127	



ID	Task Name
128	**404-000 IT Management & Planning Segment**
129	**IT Infrastructure**
130	**Tiered Storage Architecture**
131	Implement Capacity Planning Tool
132	ILM Architecture Defined
133	Tiered Storage Solution for Office Automation
134	Implement Enterprise Email Archiving Solutions SI-wide
135	Expand Storage for Digital Assets
136	Storage Virtualization Architecture
137	**NZP 2nd Point of Redundancy on SInet**
138	**DNS Upgrade for IPv6 and DNSsec**
139	**FTP Redesign**
140	**List Server Upgrade and Redesign**
141	**IPv6**
142	Server Transition
143	Workstation Transition
144	Fully functional IPv6 Environment
145	**Server Replacement Program**
146	Replace oldest servers
147	Retire/Consolidate oldest servers
148	**Server Virtualization Pilot (XEN Platform)**
149	**Upgrade Remote Access to SInet**
150	**Secure Wireless Network**
151	SI-wide Port Level Authentication
152	Additional Access Points
153	**Network router and switch upgrade for STRI**
154	**VoIP**
155	STRI
156	NZP-CRC
157	SERC
158	**Centralized Video Conferencing Management**
159	Integrate Meeting Place Scheduling with Exchange
160	Integrate Meeting Place Audio Server and Call Manager
161	Implement Decentralized Administration & Scheduling



ID	Task Name
162	**Periodic Hardware Replacement**
163	Desktop workstations and printers
164	Scientific Workstations
165	**Google Search Appliance**
166	Implement Universal Search
167	Develop Centralized Tools and Failover Architecture
168	Integrate new Google Search technology
169	**SharePoint**
170	MOSS 2007 Upgrade
171	Migrate replaced WSS version content
172	System fully operational
173	**Security**
174	Replace Firewalls
175	Install Firewall Reporting System
176	Deploy SI Enterprise anti-virus at SAO
177	Deploy IPS/IDS in SAO and SE Environments



Information Technology Resources Summary

The table below summarizes Federal IT resources at the Smithsonian for the previous and current budget years, as well as those anticipated for FY 2010 as submitted to the Office of Management & Budget (OMB) in the Exhibit 53.

LOB*		FY 2008	FY 2009	FY 2010
TOTAL ($ in millions)		**61.15**	**64.42**	**69.07**
Part 1: IT Systems by Mission Area		**28.82**	**28.35**	**30.36**
Financial & Administrative Management		**15.44**	**14.42**	**14.82**
402	Enterprise Resource Planning System	11.41	11.80	12.01
401	Facilities Management System	1.67	1.04	1.07
106	Smithsonian On-Line Academic Appointment System	0.33	0.20	0.20
401	Security Management System	0.84	0.09	0.24
401	Other Administrative Management Systems	1.19	1.30	1.30
Collections Management		**11.92**	**12.28**	**13.90**
106	Art Collections Information System (ArtCIS)	1.77	1.89	1.95
106	American Indian CIS (NMAI CIS)	4.03	4.11	4.03
106	American History CIS (NMAH CIS)	0.71	0.49	0.77
106	SI Research Information System (SIRIS)	0.62	0.68	1.04
106	CIS Pool	0.91	0.94	0.94
106	NMNH Research & Collections Information System (RCIS)	3.62	3.92	3.93
106	Zoological Information Management System (ZIMS)	0.15	0.15	0.15
106	TRAX	0.11	0.10	0.10
106	Enterprise Digital Asset Net (EDAN)	0	0	0.52
106	Central Digitization Office	0	0	0.47
Scientific Research		**1.44**	**1.62**	**1.62**
109	SAO Scientific Computing	1.27	1.35	1.35
109	Scientific Application Software	0.17	0.27	0.27
E-Gov Initiatives		**0.02**	**0.02**	**0.02**
403	E-Learning System	0.02	0.02	0.02
Part 2: IT Infrastructure & Office Automation		**31.74**	**35.41**	**38.02**
404	Managed IT Infrastructure	31.33	34.99	37.60
404	IRM Pool	0.40	0.42	0.42
Part 3: Enterprise Architecture & Planning		**0.59**	**0.66**	**0.68**
404	IT Architecture & Planning	0.59	0.66	0.68

* Federal Enterprise Architecture Line of Business Code

CHAPTER 1
Plan Overview

1.1 Mission

The vision of the Secretary sets the direction for carrying out the mission of the Institution to increase and diffuse knowledge. Increasingly information technology is an enabler in the execution of the Smithsonian's mission, while IT infrastructure and administrative systems provide basic support for staff functions throughout the Smithsonian as well as the IT and telecommunications on which they rely.

Since Secretary G. Wayne Clough's arrival at the Smithsonian in FY 2008 the Institution is revisiting how it intends to remain relevant and contribute to society in the upcoming decades. Secretary Clough has stated that:

> *Creating and sharing knowledge remains the core of the Smithsonian Institution. For 162 years, the Smithsonian has been faithful to its mission. It is now the turn of our generation to build on the work of those who have gone before us and ensure this Institution remains a great resource to our nation and the world.*

An Institution-wide discussion and almost year long introspective study will be conceptualized in the Smithsonian's Strategic Plan to be delivered near the end of FY 2009. The Secretary gave a glimpse at what may be emphasized in the strategic plan in his Installation speech delivered in January 2009 with an emphasis on education, climate change and biodiversity, and American identity and diversity.

1.2 Purpose of this Plan

The Institution continues to faithfully execute its mission, expressed as a mandate in the will of James Smithson, for the increase and diffusion of knowledge among men. The *Smithsonian Information Technology Plan* (SITP) documents the role that information technology (IT) plays in fulfilling that mission, as well as goals that recognize the need to enhance public impact, perform first-class scientific research in its areas of strength, modernize management systems, and achieve financial strength. The SITP defines a vision for the current and future IT environment that will enhance the quality of services to the public through the museums, publications, outreach activities, and research of the Institution.

The Smithsonian has developed an ambitious strategic plan to help position it to operate effectively in the 21st century. An important component of its overall agenda is achieving management excellence by modernizing its management systems and bringing each of them to a level of quality and sophistication appropriate to an organization of its size and complexity. The Institution leverages information technology to help:

- Modernize financial, human resources, collections, and facilities management;
- Enhance public outreach through the World Wide Web;
- Add new capability by migrating operation of automated information systems to a secure, standards-based IT infrastructure.
- Protect the Smithsonian's digital assets and secure the Smithsonian's role in the digital world.

This plan offers information on the strategic vision of the Smithsonian for its IT modernization efforts, as well as associated management strategies, planning assumptions and constraints, decision-making processes, and priorities. In addition to the strategies that the Institution applies to all IT efforts, the SITP provides high-level operational plans for IT projects underway or anticipated during the planning period.

The creation of this plan involves engaging executive-level management and program sponsors in the IT planning process, and focusing increased attention on IT investment decision-making and performance management. It is used to provide information and justification necessary to program IT resource requirements into the budget process, and presents the planned allocation of funds for IT activities to executive management, program sponsors, and customers.

1.3 Governing Strategies

The Chief Information Officer has developed four governing strategies that represent fundamental principles for managing IT resources and meeting the information needs of the Smithsonian:

1. Project management;
2. Application software;
3. Data management;
4. IT infrastructure: hardware, network and system software.
5. IT Security Enterprise Program

Project management strategies address overall management, control, and resource allocation for IT projects by:

- Managing major IT projects as investments. The projects focus on identifying and producing measurable program improvements; and applying project risk management principles.

- Emphasizing incremental delivery of products and services under life cycle management practices for system development and maintenance activities.

- Providing information technology products and services in a timely manner and a useful format.

- Applying integrated project team management principles and staffing IT project teams with a mix of functional area and highly skilled IT personnel.

- Monitoring scheduled performance. Each major IT project is baselined in the project management control system to ensure adequate visibility into actual progress.

- Acquiring IT resources competitively and adhering to current and planned IT standards at the Smithsonian.

- Evaluating the costs, benefits, and feasibility of alternative solutions prior to committing resources for new IT projects or enhancements to existing systems.

Application software strategies embrace analysis, design, development, implementation, operation, and maintenance or enhancement of application software in order to improve business processes. They require:

- Reengineering business process prior to application software design and development whenever practical.

- Prototyping when appropriate to define requirements more clearly.

- Emphasizing use of commercial software products and software reuse in all IT projects.

- Applying appropriate security mechanisms and controlling application software with respect to access, authority to modify, and ability to operate.

Data management strategies cover the standardization, control, and integrity of data stored and manipulated by:

- Standardizing data elements to facilitate data sharing, data re-use, and interoperability among information systems.

- Using applicable Smithsonian, Federal, and community standard data elements in IT systems before creating unique new ones.

- Migrating to a standard database management system for all applications whenever cost-effective and feasible.

- Providing for the integrity, confidentiality, reliability, and overall security of data by limiting access to authorized users, program areas, and networked information systems.

Information technology infrastructure strategies include operations, modifications, augmentation, replacement, and maintenance of computer and communications equipment, telephone, network facilities, and system software. They require:

- Migrating the IT infrastructure to a standards-based environment in order to provide a common platform for voice and data.

- Using standard applications and system software to improve the consistency of the IT architecture.

- Migrating to a web-based, distributed computing architecture.

- Adhering to current and planned standards and IT products in the Smithsonian's Technical Reference Model.

- Providing IT infrastructure security services for external and internal access, disaster recovery, and incident responses.

IT Security Enterprise strategies include five categories of IT Security Controls envisioned to work in concert to protect the mission of the institution:

- Operational Controls / Security Operations Center (SOC) provides protections against threats to the IT Infrastructure, Web portals, general support systems and major applications. The SOC includes support for firewalls, web filters, Network Intrusion Detection (NIDS), Antivirus, and Host Intrusion Preventions (HIDS) and detection capabilities.

- Compliance Monitoring includes Certification & Accreditation.(C&A) as a vehicle to increase the availability, integrity and confidentiality of data, systems and networks by ensuring appropriate NIST SP 800-53 security controls are implemented commensurate to risk understood by the system sponsors, while supporting weakness remediation.

- Policies & Procedures / Enterprise Architecture improved through an increased tracking of NIST publications on IT security practices is need for incorporation into annual Smithsonian IT Security policy and procedural updates.

- Program Management Controls to support FISMA reporting / OIG Audits for OMB / Congressional oversight committees.

- Engineering / Technical Controls to increase Unit implementation of NIST SP 800-53 controls for management, operational and technical as well as to improve security engineering for major application and Web 2.0 development in order to reduce vulnerabilities to cross-site scripting, SQL injections, and increase collaborative IT security controls.

Together these governing strategies guide IT initiatives to enhance the quality of IT support for all Smithsonian customers.

1.4 Plan Organization

The Smithsonian's IT infrastructure services the Institution as a whole as detailed in Chapter 6. Each program area, however, has ongoing and planned efforts to develop and build automated information systems to support specific functions. Initiatives in each program area are detailed in Chapters 2 through 5 and are mapped to the Federal Enterprise Architecture (FEA) line of business and sub-functions are referenced per the *FEA Business Reference Model*. Chapter 7 describes the enterprise architecture approach and major EA initiatives.

The Strategic Overview provided at the front of this document is also intended to be a stand-alone document. It provides a high-level description of how the Smithsonian intends to leverage information technology to support its overall mission, goals, and objectives during the planning period including its aspirations when fully funded.

CHAPTER 2
COLLECTIONS MANAGEMENT PROGRAM AREA

2.1 Overview

The national collections predate the Act of August 10, 1846 that established the Smithsonian. Section 6 of this Act authorized the transfer of collections owned by the Government to the Institution. Joseph Henry, the physicist who became the first Smithsonian Secretary, insisted however that if the Institution accepted the collections they would be used not only for public amusement, but also for research. In so doing, he assured the inseparability of objects, specimens, and documents from the knowledge they generate. The result has been the development of incomparable information repositories that also include the letters and notebooks of 19th century artists, soldiers, scientists, and successive collectors of objects and ideas.

The Smithsonian holds the national collections in trust to benefit those among whom the Institution increases and diffuses knowledge: people everywhere. This responsibility, as well as legal issues inherent in relationships with donors, artists, vendors, and others, demand that they be managed to the highest standards of security and safety and in a manner that provides the greatest public benefit. To fulfill that responsibility—yet balance the conflicts inherent in security and accessibility—the Institution acquires, develops, and maintains collections information systems that enhance access to and accountability for the collections while also ensuring long-term preservation of collections information.

For more than three decades, the Smithsonian has been digitizing its collections, archives, library, and research information; and is continuing to migrate legacy collections information from local standalone systems to commercial software products and enhancing the content with scientific, cultural and artist contextual information documenting the significance of these holdings. Digitizing means capturing text, images, sound, and multimedia in electronic form, organizing it in databases, adding the information that makes it meaningful (metadata), and making it accessible for collections management purposes, research and education.

Digitizing collections-related information (images, sound, and multimedia) also helps the Institution achieve its goals of enlarging its audiences and their degree of engagement with it, enhancing its research in science, culture and the arts; and modernizing its methods of collections management. Digitization combined with electronic delivery via the Web and other new media outlets, enables the Smithsonian to expand its educational mission by delivering resources to millions of schools and homes.

Researchers around the world use the collections for scientific purposes—to identify species, to assess the biodiversity of a region, to study geological processes and history—by accessing Institutional data from their desktop computers. On a more basic level, failure to develop digitized repositories of collections would threaten the ability of the Smithsonian to carry out its responsibilities for their stewardship and to counter catastrophic accident, fire or flood loss, and deterioration.

Today the Institution has more than 137.2 million objects and specimens in its collections. It manages them with more than thirteen million automated records that sometimes represent more than one item, as in the case of natural history specimens and archaeological material. Among its automated records, most of which are skeletal and need extensive work to enhance their content, a digital image exists for more than one million objects.

In August of 2006, the Smithsonian initiated a pan-Institutional discussion on digitization that drew on the collective knowledge and experience of the Smithsonian staff. This discussion identified the need for a pan-Institutional digitization strategic plan; a plan that ensures that the Institution develop a digital Smithsonian Institution which encourages and supports information sharing and dissemination, internally and externally. Insufficient centralized infrastructure however, particularly in the areas of pan-Institutional policies and technical standards, digital storage, and reconciled data standards, are major constraints on the creation and management of digital assets. Recommendations which grew from this discussion address these insufficiencies.

In FY 2007, in response to the recommendations, the Smithsonian established a Central Digitization Office (CDO) within its OCIO to serve as a center of excellence for digital initiatives, to lead the development of the pan-Institutional digitization strategic plan, to facilitate the development of attendant policies, and to facilitate the development of pan-Institutional digital file and data standards. In late 2007, the Institution formed a Digital Media Use Working Group for the purposes of developing an Institution-wide policy on the access, sharing, and use of digital assets both within and external to the Institution. The resultant policy will help drive the requirements for enterprise systems which facilitate access (EDAN), trusted digital repositories, and how information may be shared via the Web.

In August 2008, the Institution formally launched the Smithsonian Digitization Strategic Plan Committee, with the charge to develop its first pan-Institutional digitization strategic plan to guide the integrated development of digital resources supporting development, research, access, interpretation, use and preservation of the Institution's physical and digital collections and research resources. The work of this committee will inform and be informed by the overarching Institutional strategic plan, and the Web and New Media Strategic Plan.

All museums and research centers plan to add to and enrich the content of their collections information systems throughout the planning period. Adding digital images and enhancing collections records of all kinds increasingly will depend on the availability of funds from non-Federal sources. Descriptions of major systems now in use or under development follow.

Descriptions of planned infrastructure enhancements needed to support growing digital collections are described in *Section 6.3 Enterprise Digital Asset Infrastructure Services.*

Program Area Snapshot: Collections Management
LOB: Education (106); Knowledge Creation & Management (202)

Retired	Production (2009)	Planned (2010 to 2014)	
		Funded	Unfunded
• Interlibrary Loan Manager (2007) • SELGEM • LCIS (NMAH)	*Target Architecture:* • ArtCIS • Castle Collection • NMAH CIS • NMAI CIS *Candidate for Replacement:* • SIRIS • Digital Library Program • Archive Management System (AMS) • Digital Logbook	• Digital Archive (2010)	• AMS Replacement • SIRIS Replacement • SIL PDS

Future Considerations / Performance Gaps

- The COTS product used by SIRIS is being discontinued and a replacement system must be identified.
- The rise of digital assets is driving significant changes in requirements especially among libraries and archives that challenge the traditional integrated library system concept.
- The public's expectations to access digital assets and the information that describes them will play a growing importance in selecting collection information systems beyond the traditional stewardship requirements for these systems.
- Interoperability between CIS and their databases will continue to be a growing requirement which may drive a convergence of databases and systems at the Institution. Different CISs were selected based on the requirements of different collections. As our CISs grow there will most likely be an importance of accommodating heterogeneity in service of coherence.

Program Area Snapshot: Collections Management
LOB: General Science and Innovation (109); Natural Resources (117); Knowledge Creation & Management (202)

Retired	Production (2009)	Planned (2010 to 2014)	
		Funded	Unfunded
• SELGEM	*Target Architecture:* • NMNH RCIS • NZP Animal Keepers' Report • Orchid CMS *Identified for Replacement:* • NZP-ARKS (2009) • NZP-SPARKS (2013) • NZP-MedArks (2011)	• ZIMS	• N/A

Future Considerations / Performance Gaps

- Once ZIMS is in production, it is expected that several systems in use by the National Zoological Park will be retired.
- Expectations by the public and cross-discipline scientists will drive the need to provide access to digital assets and the information that describes them in selecting collection information systems beyond the traditional stewardship requirements for these systems.
- Interoperability between CIS and their databases will continue to be a growing requirement which may drive a convergence of databases and systems at the Institution.

2.2. Library & Archive Systems

2.2.1 Smithsonian Institution Research Information System (SIRIS)

Line of Business	Sub-function
Education (106)	Cultural & Historic Preservation (017) Cultural & Historic Exhibition (018)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)

a. Description

The Smithsonian Institution Research Information System (SIRIS) supports management of and public access to holdings in 20 libraries, 14 archives, and other specialized research databases at the Smithsonian. Easily accessible via the web, SIRIS provides worldwide access to 1.7 million text records with hyperlinks to images, video and sound files, electronic journals, and related websites. In FY 2008, there were 6.1 million page views from the SIRIS' Cross Searching Portal.

Since 1985, SIRIS has used commercial, off-the-shelf software. Today, SIRIS is based on the commercial product *Horizon*. The holdings of SIRIS include:

- *The Smithsonian's Library catalog.* Smithsonian Institution Libraries provides access to more than 1.5 million volumes that include journal titles, maps, computer files, video recordings, sheet music, and trade literature in its collections. The Libraries' catalog also contains more than a million name, subject, and series authority records. In addition to providing access to the Libraries' collections, SIRIS points the Web user to the Libraries' digital editions of rare books, manuscripts, trade literature, and bibliographies representing a range of subjects.

- *Archival, Manuscripts & Photographic Collections catalog.* The Archival, Manuscripts and Photographic Catalog is comprised of over 271,000 primary bibliographic records and over 189,500 related authority records. The records contain descriptions of archival, manuscript, and special collections resources at the Smithsonian, including institutional and organizational records, personal papers, manuscripts, oral histories, works of art, photographs, sound recordings, films, and other media materials from 12 archival repositories at the Institution. The records are stored and retrieved together in the catalog, which contains approximately 164,000 linkages to multimedia files.

- *American Art Museum Art Research Databases.* Created and maintained by the Smithsonian American Art Museum, these research databases provide descriptive information on over 670,000 artworks, recording America's artistic heritage from colonial to contemporary times. The databases include the Inventory of American Paintings Executed before 1914, the Inventory of American Sculpture (with records from the Save Outdoor Sculpture! program), SAAM's Photograph Archives, and the Pre-1877 Art Exhibition Catalogue Index. The databases are used to support collection development, exhibition research and educational initiatives both within and outside the Institution.

- *History of the Smithsonian catalog.* Maintained by the Institutional History Division of Smithsonian Institution Archives, this catalog is comprised of over 8,500 records documenting the history of the Smithsonian, including bibliographic citations, legal citations, a chronology of important events, historic images, and biographical information on the Board of Regents.

- *Specialized Research Bibliographies catalog.* This catalog provides access to nearly 16,900 bibliographic citations on a variety of specialized topics—from cephalopods and marine mammals, to museum studies.

- *Directory of Airplanes Catalog 47,669* individual aircraft and aircraft manufacturer records comprise this authority listing, which is an online expansion of *The Smithsonian National Air and Space Museum Directory of Airplanes, Their Designers and Manufacturers*. This new authority database has been officially recognized by the Library of Congress and assigned a cataloging code, "**smda**," to be used in MARC records created by catalogers worldwide.

During the planning period, the SIRIS community will re-evaluate the software product, *Horizon* by SIRSI/Dynix. This re-evaluation is precipitated by two factors: 1) In March 2007, Horizon's vendor announced that it is abandoning further development of Horizon products, choosing instead to support *Symphony* software, another of its library management systems. SIRSI/Dynix is encouraging its current customers to migrate to this new solution. 2) At the same time, the digital world, end user expectations and mode of information delivery are driving changes especially for the library and archival professions.

Given these changes, during the planning period the SIRIS community will re-assess its functional needs, define new system requirements and seek new solutions that meet their needs before selecting a follow-on solution to the current day *Horizon* implementation. In evaluating options, consideration will be given to software systems that are beyond the traditional Integrated Library System (ILS) model which has become out dated given new trends and requirements.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Horizon Operational	1985		1985
Implement Horizon 7.3.1 software	03/2004		03/2004
Implement image database (SIA)	05/2004		02/2004
Implement Board of Regents database (SIA)	07/2004		05/2004
Deploy inventory module	06/2004		06/2004
Test disaster recovery plan	07/2004		08/2005
Implement new catalog: Directory of Airplanes	09/2006		09/2006
Develop and implement an online Cross-Searching Center for all *Horizon* databases	08/2007		08/2007
Migrate Freer Sackler library records into SIRIS	10/2008		8/2008
Form Technical Working Group	02/2008		03/2008
Define functional requirements, conduct market survey, prepare analysis/report of findings; and narrow the field for system replacement alternatives	03/2009		12/2008
Acquire/upgrade new system	06/2011		
Test new system	12/2012		
New system operational	01/2013		

c. Benefits

SIRIS supports the Smithsonian strategic goal of Increased Public Engagement: Enlarge the Smithsonian's audiences, expand its degree of engagement with the public in Washington and throughout the country, improve the quality of the Smithsonian impact on its audiences both through its public programs and scientific research; and improve the stewardship of the national collections for present and future generations. It does so by providing:

- **Public access.** Information about the Institution's library and archival holdings (some 1.5 million volumes and archival collections that house more than 45,000 linear feet of documentary material), as well as specialized research materials and resources—is delivered efficiently on an integrated, web-based system. Students, teachers, and researchers can search SIRIS 24 hours a day.

- **Efficiencies of scale.** Multiple Smithsonian repositories have pooled their data in SIRIS—a central, standards-based retrieval system—thereby avoiding wasteful redundancies and promoting efficient, shared methods of describing their collections.

- **Elimination of paper records.** Many units contributing to SIRIS have eliminated paper records for inventory and collections tracking, which has resulted in savings and increased efficiencies because inventories can be completed more rapidly and reliably.

d. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	1985
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• ACM • AAA • CFCH • CHNDM • FSG • HMSG • NASM • NMAfA • NMAH • NMNH • NMAI • NPG • NPM • NZP • OFEO • SAAM • SCEMS • SERC • SIA • SIL • STRI

2.2.2 Digital Library Program

Line of Business	Sub-function
Education (106)	Cultural & Historic Preservation (017) Cultural & Historic Exhibition (018)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)

a. Description

The Digital Library Program (DLP) is a complete imaging operation geared specifically to digitizing library materials. Consisting of state-of-the-art imaging equipment, it works with national and international standards for digital imaging to develop products that support the Smithsonian research community with additional access to the Libraries' collections.

To achieve a high level of throughput and react rapidly to changing needs, an imaging center such as the DLP has become essential. With permanent, contract, volunteer, and intern staff, it can move nimbly to assist in achieving SIL goals and the greatest output of digital products. The DLP will need continual upgrades of equipment and software for increased productivity, along with expansion, to handle more types of material.

Images generated by the DLP are available through the websites of the Smithsonian Institution Research Information System (SIRIS) and the Smithsonian Institution Libraries in content groups such as the Libraries' *Galaxy of Knowledge* and the *Galaxy of Images* on http://www.sil.si.edu. The design of image naming conventions, as well as of image, item, and project metadata, has been developed with an ability to incorporate images into the Institution-wide, public access database that the Smithsonian anticipates creating.

The DLP has 93 complete digital editions, collections, born-digital publications, online exhibitions, webcasts, bibliographies, and more available on the SIL website. Additionally, the SIL *Galaxy of Images* website includes images generated by other SIL outreach activities and currently includes over 7,300 images. To date, there are approximately 71,000 images available on the SIL site. Extensive metadata records exist for all top-level items.

This system will need to be replaced with a modern Page Delivery System (PDS).

b. Benefits

Through digital editions and collections, the DLP allows Smithsonian Institution Libraries to present its unique collections to the public and targeted groups such as hobbyists, scientists, and scholars. The DLP also participates in the SIL exhibitions program, as well as in loans to national institutions and other Smithsonian units, by providing images for installation graphics and online exhibitions. Digital editions, collections, and online exhibitions are created with introductions and guides to provide context and make them more accessible to the average viewer.

In addition the DLP offers increased access to materials from the Smithsonian Institution Libraries' collections by reformatting them. As an example, many rare and fragile materials are available only for consultation onsite in Washington. Whereas online access makes surrogates of these objects available to a worldwide audience.

The success of the DLP is gauged by tracking:

- Increases in the number of visitor sessions each year to digital collections and online exhibitions on the SIL website.
- Increases in the number of newly created digital editions, online collections, and online exhibitions each year.

c. Status @ a Glance

Funding Status (FY10):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	1994	
Enterprise Architecture:		Target Architecture
	X	Candidate for Replacement
Units Supported:	•	SIL

2.2.3 SIL Page Delivery System

Line of Business	Sub-function
Education (106)	Cultural & Historic Preservation (017) Cultural & Historic Exhibition (018)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)

a. Description

The Smithsonian Institution Libraries Page Delivery System (PDS) is an architecture that allows for the delivery of online books. Unlike many digital objects, digital books need to provide some replication of the structure and use of the physical object. This includes browsing pages in a linear fashion, jumping around randomly in the text, using an index and/or table of contents (automatically or hand-derived) to find specific locations in a volume, or online book.

The current rudimentary SIL PDS is based on SQL and ColdFusion. It serves only rudimentary requirements and does not offer full-text searching of the volumes or other features. Once funding is identified, a replacement SIL PDS will be implemented with enhanced functionality to meet user expectations, and achieve the benefits described below.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Identify architecture for a PDS	9/1/2009		
Implement PDS for existing digital volumes	9/1/2010		
Integrate all book scanning into PDS workflow	10/1/2010		

c. Benefits

The proposed SIL PDS will also allow for automated production of digital books and eliminate much of the hand work that goes into the current production model. It will allow readers of SIL digital books to:

- Do full-text searching of volumes
- Flip through books in a linear fashion
- Go directly to specific pages or sections

- Integrate whole books, individual pages, or parts of books into other projects

c. Status @ a Glance

Funding Status (FY09):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:	TBD	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SIL

2.2.4 Archive Management System

Line of Business	Sub-function
Education (106)	Cultural & Historic Preservation (017)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)
Information & Technology Management (404)	Information Management (142)
	Record Retention (141)

a. Description

The Archive Management System (AMS) is a collection management and information system particularly designed to handle the needs of an archives and research organization. The AMS facilitates proper management of Smithsonian Institution Archives (SIA) collections including the following functions: intellectual control, rights management, preservation management, and space management. These features yield full and efficient control of SIA's collections in every stage of curation, storage, preservation, and research use. The system provides centralized management of SIA collections in the District of Columbia, Virginia, Maryland and Pennsylvania; as well as to objects on loan from SIA to other museums and galleries in North America.

Because of its unique combination of functionality, a replacement AMS is being considered for use by other archival units as well. In order to do this, the AMS would require a platform migration in order to handle the additional demand and enhance support services. The AMS will need regular equipment and software upgrades to meet increased productivity and expansion for new types of archival materials and activities.

Descriptions of more than ninety percent (90%) of SIA's unrestricted collections are made available to the general public and web-based search engines through the Smithsonian Institution Research Information System (SIRIS) Archives catalog and SIA's website http://siarchives.si.edu. Extensive metadata is available for all accessioned material.

b. Benefits

The integration of specialized features into a single, centralized archival management system allows Smithsonian Institution Archives to tailor access to its unique collections to researchers and others and manages any special rights or restrictions that may exist. The AMS facilitates use of the collections in scholarly publications, films, special Institutional initiatives (e.g., Smithsonian Networks), as well as loans to national museums and other Smithsonian units.

The success of the AMS is gauged by tracking:

- Identification of architecture and platform modifications necessary to support use by multiple archives and similar groups within SI.
- Maintain 80% online availability or higher
- Support planning and tracking of collection relocation from Virginia storage to other SIA collection facilities.

c. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	1998
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• SIA

2.2.5 Digital Archive

Line of Business	Sub-function
Education (106)	Cultural & Historic Preservation (017)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)
Information & Technology Management (404)	Information Management (142)
	Record Retention (141)

a. Description

The Smithsonian Institution Archives (SIA) is a premier repository for archival records of American science and exhibition history as well as the official records of the Institution from its inception to the present. It is the Smithsonian Institution Archives mandate to preserve these records and make them accessible to researchers and scholars for generations to come.

Digital records first became part of the Institution's historical record over four decades ago and have quickly grown to become a significant part of the Smithsonian's historical record. For example, the last two Smithsonian museums mandated by Congress used the Internet to launch their content before construction of their physical facilities was complete. Another example of digital records the Digital Archive houses is the official business correspondence now largely conducted via email.

In addition to regular research use, digital records from SIA have been used in exhibitions, publications, documentaries, and films.

The Digital Archive provides the following services and functions:

- Digital preservation of both digitized and original digital objects based on best practice
- A trustworthy digital repository that conforms to national and international standards
- Extensive metadata records on SIA's digital collections
- State-of-the-art search and retrieval systems
- Ongoing development of policies and standards related to digital records at pan-Institutional, national, and international levels.

The Digital Archive has grown dramatically over the past five years. Its rate of growth will only accelerate in the next five years with several digitization projects currently scheduled which will generate a rapid growth rate spike that must be accommodated. Sustained success will depend on regular equipment and software upgrades and staffing expansion to meet increased scalability and productivity needs as well as expansion for new types of archival materials and services. The Digital Archive collections will support pan-Institutional efforts to increase virtual access to the combined resources of multiple units.

The Digital Archive leverages enterprise COTS systems installed at the Smithsonian as well as open source solutions to achieve the required system functionality. Smithsonian Institution Archives works with OCIO and other Smithsonian units to take advantage of server consolidation and application co-location opportunities. The metadata standards employed have been specifically chosen to permit integration with other Smithsonian systems.

b. Benefits

The Digital Archive enables the Smithsonian Institution Archives to prevent the loss of a critical and growing part of the Institution's historical records. It stores, manages, and provides access to the digital records of SIA's collections to ensure retention of this segment of history for decades to come. Its digital access capabilities provide greater remote access to more objects within the collections.

The Digital Archive handles a wide range of data formats thereby making it possible to preserve many different record types including:

- e-mail correspondence
- websites
- blueprints
- webcasts and podcasts
- streaming audio and video
- databases
- images
- and oral and video histories

The implementation of the Digital Archive, based on national and international standards of trusted digital repositories, provides leadership to archives both at the Institution as well as across the archival profession.

c. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	*2010 (planned)*	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SIA
	•	SI-wide

2.2.6 Digital LogBook

Line of Business	Sub-function
Education (106)	Cultural & Historic Preservation (017)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)
Information & Technology Management (404)	Information Management (142)

a. Description

The Digital LogBook, an image archiving system, handles all cataloging, storage, and retrieval of images, as well as digital images, managed by the Smithsonian Photographic Services (SPS) division. SPS images include over two million photographs in a variety of physical formats, the oldest of which date back to the mid 1800s..

Photographic Services staff, as well as staff photographers from other SI units (NMNH, NMAH, MSC, and all three major NASM facilities), use the Digital LogBook in the course of their daily workflow. The system is integral to the fulfillment of requests made by the public and researchers for Smithsonian images. The LogBook interacts with the Smithsonian Digital Asset Management (DAM) system to accommodate the rapidly increasing need for storage space. The DAM when fully implemented will function as a data store for the Digital LogBook.

c. Benefits
The LogBook's processing time for fulfillment orders for pre-existing digital images is reduced.

c. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	1999	
Enterprise Architecture:		Target Architecture
	X	Candidate for Replacement
Units Supported:	• SIA	• SI-wide

2.3 Museum Systems

2.3.1 National Museum of American History Collections Information System (NMAH CIS)

Line of Business	Sub-function
Education (106)	Cultural & Historic Preservation (017)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)

a. Description

For more than 30 years the National Museum of American History has relied on automated systems and digitizing its collections to support its mission:

> *…to inspire a broader understanding of our Nation and its many peoples by creating learning opportunities, stimulating imaginations and presenting challenging ideas about our country's past.*

The National Museum of American History Collections Information System (NMAH CIS) supports collections management, research, and public access to the Museum's intellectual and physical collections. It serves a world wide audience of researchers, educators, museum professionals, and the general public.

The NMAH CIS is used to store and retrieve collections information that documents the identity, condition, historical, scientific, aesthetic, and legal significance of collection items. The NMAH CIS uses the *MIMSY XG* (formerly *Multi Mimsy)* commercial collections management software product.

Since the implementation of *Multi MIMSY* in February 1996, progress has been made in several areas, and urgencies within the CIS program have been documented.

1. NMAH completed the conversion of two of its three automated legacy collections management systems. Conversion of the third system is near completion. Analysis is underway to quantify the remaining work and the time required to complete it.

2. In July 2003, NMAH documented that the CIS was unstable and continuing to decline due to lack of sufficient resources. Collections accountability had eroded across all areas. Minimal CIS activities could not be supported nor could new work generated by museum projects and programs be supported

as they should. The collections information system could not be systematically monitored and as a result, it contained increasing amounts of data that were unreliable. Two recommendations were proposed: one (with 5 actions) for stabilizing and fully supporting the CIS and, alternatively, one for documenting and shutting down CIS if adequate support could not be provided.

3. The following actions were undertaken in support of the recommendation to stabilize the CIS program.
   a. In October 2007, hired a new CIS manager.
   b. In June 2005, a new staff position to support digital asset management was created through reprogramming a work-year within NMAH.
   c. CIS pool funds were acquired to support analysis by an outside consultant of the current state of data in CIS.

4. The Multi MIMSY data analysis was completed in September 2006. The consultant's final report documents that the NMAH's CIS is in serious jeopardy. Information residing in the system is inconsistent, error-ridden, and unreliable. Human and financial resources that support the system have been cut below the point of sustainability. There are virtually no resources available for maintaining the CIS, developing the standards needed to effectively retrieve information from it, or for providing critical training and support to Museum staff that use the system.

In the fall of 2006, while the findings and recommendations of the data analysis were being reviewed, NMAH was notified that maintenance and technical support for MIMSY would end in August 2007. This notification provided a definite timeframe by which NMAH had to move to MIMSY XG (XG), the MIMSY replacement system. By March 2007, a five phase XG implementation plan was developed, that included the requirement to analyze all collections management functions to ensure that new XG features were incorporated appropriately.

- NMAH secured full funding for Phase 1 to undertake the initial upgrade of MIMSY to XG and implement the system to meet curatorial requirements. On February 1, 2008 XG became available for curatorial use. By the end of April, Phase 1 work was completed--on time and within budget.

- NMAH secured full funding for Phase 2 to continue the XG upgrade work and begin the first part of XG implementation to meet collections management requirements. Phase 2 work was completed by September 2008.

- NMAH secured full funding for Phase 3 to continue the XG upgrade work and continue the implementation of XG to meet collections management requirements. Phase 3 work is underway, and is scheduled to be completed by April 2009.

In late spring 2008, a staff vacancy was reassigned to the CIS program. In September 2008, a new staff member was hired to support collections documentation across curatorial and collections management units.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Deploy Multi MIMS*Y* version 2.5.2d	04/2001		04/2001
Migrate legacy data: 505,000 SELGEM records			8/2001
Migrate legacy data: 125,000 FileMaker Pro records	11/2001		11/2001
Migrate legacy data: 124,000 LCIS records	10/2002		12/2002
Upgrade CIS server and DBMS	12/2001		11/2001
Data entry for backlogged acquisition records (3,123 records)	12/2001		9/2003
Create digital images of 13,800 objects and link these to Multi MIMSY records	09/2002		9/2004
Document current state of CIS data and the measures baseline information needed for short-term stabilization of the CIS program and long-term strategic planning for the program.	09/2004		9/2006
Identify processes and establish procedures for preparing Multi MIMSY object records (text and images) for display on the Museum's Internet site in the context of NMAH Web redesign project. Carry out "Collections on the Web" pilot, using 260 objects	11/2004		7/2005
Carry out pilot project to digitize images of 5000+ objects and link these to Multi MIMSY (part of NMAH DAM Program start-up)	09/2006		4/2007
Carry out pilot project to digitize 500+ audio files of and link these to Multi MIMSY (part of NMAH DAM Program start-up)	09/2006		4/2007
Relocate CIS servers to SI Data Center in Herndon, Va	06/2007		1/2008
Upgrade NMAH CIS to MIMSY XG	06/2007		2/2008
Implement XG to meet curatorial requirements.	02/2008		2/2008
Implement XG to meet collections management requirements	04/2010		

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Develop middleware to bridge SI DAM with MIMSY XG	04/2010		
Develop systematic and comprehensive CIS training program	04/2010		
Standardize metadata for 2 terabytes of existing digital files	06/2010		
Reconcile/verify Offsite storage locations and merge data with XG records	09/2010		
Migrate digital files to SI DAM	09/2010		
Complete data clean-up work identified in the 2006 NMAH CIS Data Analysis Report [aka Zorich Report]	12/2010		

c. Benefits

Through a fully funded CIS, NMAH can improve data quality, quantity, and access to its collections thereby insuring full physical, legal, and intellectual control over the national collections. The NMAH CIS also supports collections management processes and transactions that the collections items undergo, and assists in improving public and staff access as well as accountability for the research integrity and physical security of the collections.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	1996	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	NMAH

2.3.2 Art Collections Information System (ArtCIS)

Line of Business	Sub-function
Education (106)	Cultural & Historic Preservation (017)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)

a. Description

Since December 1998 the Art Collections Information System (ArtCIS) has been fully operational in ten of the Institution's museums expanding beyond the initial Institution's art museums. ArtCIS museum's are unified by their utilization of the commercial software product *The Museum System* (*TMS).*

TMS serves museum collections management needs and provides easy access to information and images in the collections. Text and image information has been captured in electronic form, organized in databases, made accessible to art museum staff to help manage collections, and made available to the public for educational and recreational purposes. In individual museums researchers, curators, registrars, and managers have access to rich and consistent information about collections from desktop computers. Each museum is working to enrich registration-level records with research findings, curatorial notes that previously have been separated, and digital images. Enhancing TMS records will continue throughout the system life cycle.

TMS consists of 10 software modules: objects, constituents, exhibitions, loans, shipping, bibliography, events, sites, insurance, and media, and provides user-friendly automation tools to assist staff and offices in describing and managing collections. These tools support internal collections management and control functions such as accessioning, describing and tracking multiple types of materials and collections, and facilitating electronic public access via the web.

The thesaurus feature of TMS allows users to apply controlled vocabularies of their own creation, as well as the *Getty Art & Architecture Thesaurus* (AAT) and the *Thesaurus of Geographic Names* (TGN). The loans, exhibitions, and shipping functions allow the museums to manage those responsibilities efficiently even when staff is dispersed across separate offices and buildings.

Individually, the ArtCIS museums have implemented those modules that best serve their objectives. Digital imaging of objects and image management allow linking any number of images and other media files to records in each module. Records are created in *TMS* for most of the objects in the art museum collections. Those representing groups of objects are being broken into individual object records when appropriate and unrecorded objects are added to enable electronic tracking of their locations and histories. Although many records are skeletal and lack images, *TMS* provides a template for entering data in a consistent and standard format.

The ArtCIS museums also use TMS to identify objects with gaps in provenance, tag the objects, and make them available for export to websites. In keeping with the requirements of the Presidential Advisory Commission on Holocaust Assets in the United States (PCHA), the art museums publish on the Web the provenance of collections objects to support efforts of the Commission to restore to rightful ownership property misappropriated by the Nazis or their collaborators during World War II.

The ArtCIS museums are establishing and documenting standards for entering curatorial and registration data so that TMS provides uniform access to collections information—including images where they exist—for internal research and management. Since acquiring and implementing The Museum System, the art museums' collaborative—ArtCIS—which consists of representatives of all member museums and the Office of the Chief Information Officer, has continued to meet regularly to share information, best practices, and solutions to problems, thereby moving all the museums forward in their implementation far more quickly than each could have achieved on its own.

Since implementing *TMS*, the National Air & Space Museum (NASM) has made tremendous strides in building a database that accurately reflects the national collections of objects and documents associated with air and space. Standards have been put in place to ensure data quality, and the number of records in the database has doubled. Of these, more than 62,000 now have enhanced content. The database also contains more than 150,000 digital images of NASM artifacts. These figures represent an annual growth rate of more than 25% since inception of TMS.

The National Postal Museum (NPM) uses eight of the functional ArtCIS modules: objects, constituents, media, exhibitions, loans, shipping, bibliography, and events. Digital image records are created and maintained in the Media module and image management allows any number of images and other media files to be linked to records in the seven other modules. TMS currently contains over 196,000 object records and over 40,000 digital images. About half of the philatelic records in the database represent multiple objects – pairs, strips, blocks and panes of stamps totaling as much as 100 objects or more per record. The digital records similarly represent a larger percentage of the museum's total holdings. Arago (www.arago.si.edu) is the public delivery component of NPM's CIS. Arago, which derives its text and images from TMS, enables anyone with Web access to view a record and image for potentially every collection object. Researchers and the general public can search across the museum's archival, philatelic, and postal operations collections.

The Anacostia Community Museum (ACM) modernized and continues to enhance the collections information and accessibility to the Anacostia Community Museum collections by completing its transition from Willoughby Associates iO collections information system to Gallery Systems' *The Museum System (TMS)*.

The primary focus of all ArtCIS museums is on the following two areas:

- *Data Enhancement.* This is the continuing process of upgrading data in existing records and creating new ones to capture contextual knowledge about a given object: its origins; historical, scientific, cultural, artistic and/or technological importance; associations with historical figures; digital images and other multimedia; and pointers to further resources, such as bibliographic and archival information.

- *Public Access.* Museums face a dilemma with respect to their collections: the balance between access and preservation. The museums take seriously their responsibility to preserve the Nation's heritage, while also striving to make artifacts accessible to the public for whom they are held in trust. The images and text held in TMS by the ArtCIS museums offer a superb opportunity for balancing these requirements by allowing a variety of clients to view and study the collections.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Implement TMS at the Art Museums	12/1998		
Implement TMS at NASM	12/1998		
Implement TMS at NPM	02/2001		
Implement TMS at ACM	12/2005		10/2005
Upgrade TMS software	10/2006	03/2007	
Launch Arago collections website at NPM	05/2006		05/2006
Upgrade software for Collections Online Web Interface	07/2006		04/2007
Consolidate ArtCIS Application Servers	06/2007		06/2007
Integrate into EDAN cross-searching: NPG, SAAM, and NPM databases	12/2008		11/2008
Implement eMuseum for ACM	12/2008		01/2009
Upgrade ArtCIS cluster to SQL Server 2005	03/2009		
Integrate into EDAN cross-searching: ACM, HMSG, NASM, NMAfA, and FSG databases	12/2009		

c. Benefits

Researchers, curators, registrars, and managers in individual ArtCIS museums have access to rich and consistent information about their collections from their desktop computers. The same kind of access is available to external audiences for scholarship and education through the *TMS* interface with the web.

The ease with which data can be entered and accessed has resulted in object records that are significantly enriched in information. Where object information once resided in paper accession files, loan documents, and curatorial research notes. Such information now is being gathered and added to ArtCIS records which are available to all. Moreover, the availability of TMS records across each museum for education, public affairs, development, and administrative staff has intensified the demand for information with new and creative applications being found for this information.

In addition, the use of *TMS* by multiple units has contributed to Smithsonian goals of standardizing procedures and terminology. Through ArtCIS, the Smithsonian can maximize the ArtCIS museums' voices to influence the *TMS* vendor to develop desired features and enhancements into the commercially available product.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	1998	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	• ACM • CHNDM • FSGA • HMSG • NASM	• NMAAHC • NMAfA • NPG • NPM • SAAM

2.3.3 National Museum of the American Indian Collections Information System (NMAI CIS)

Line of Business	Sub-function
Education (106)	Cultural & Historic Preservation (017) Cultural & Historic Exhibition (018)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)

a. Description

The documentary value of a museum collection is a principal criterion for its excellence. Well documented results of cultural, historical, aesthetic, and scientific research enable the NMAI to fulfill its mandate to increase and diffuse knowledge. The primary purpose of collections information—documentation of the intellectual significance, physical characteristics, physical location, and legal status of collection items, as well as how they are cared for and used—is to provide access to the intellectual content of NMAI collections, research findings, and the stories they can tell; and to manage collections appropriately. To support this goal, the NMAI has a responsibility to acquire, develop, and maintain collections information systems that enhance access to and accountability for its collections and research findings and to ensure long-term preservation of the resultant information in manual and electronic formats. Together, the Museum's collections information systems support and meet Smithsonian and NMAI missions and public access goals.

The NMAI has one of the most extensive collections of Native American arts and artifacts in the world—more than 266,000 catalog records (825,000 items) representing over 12,000 years of history and over 1,200 indigenous cultures throughout the Americas. The Museum's holdings also include the Photographic Archives (approximately 324,000 images from the 1860s to the present); the Media Archives (approximately 12,000 items) including film and audiovisual collections such as wax cylinders, phonograph discs, 16mm and 35mm motion picture film, magnetic media of many varieties, and optical and digital media recorded from the late 1800s through the present; and the Paper Archives (approximately 1522 linear feet) comprised of records dating from the 1860s to the present that preserve the documentary history of the NMAI, its predecessor the Museum of the American Indian–Heye Foundation (MAI), and their collections as well as other documentary and archival materials.

NMAI's central CIS is a highly customized version of the commercial product, KE Software's *Electronic Museum (EMu)*, and is currently the system of record for the Object collections as well as the Photographic Archives collections. The database for the Paper Archives—which includes all older collections related documentation—will also be incorporated into CIS and re-associated with the Object and Photo Archives collections they document. Records for the Media

Archives are maintained in the Smithsonian's Digital Asset Management (DAM) system; which serves as a CIS for that collection and is used to manage both digital and non-digital media items.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Initiated survey of commercial CIS products	09/1997		09/1997
Initiated Move information system project	10/1998		10/1998
Deployed Move information system	05/1999		05/1999
Migrated Move information system to SQL	12/2001		12/2001
Re-engineered Move information system	04/2002		09/2002
Established NMAI CIS Steering Committee	09/2001		09/2001
Completed CIS requirements analysis & market survey	02/2002		04/2003
Prototyped Web content management software	03/2002		08/2003
Acquire CIS software product	05/2002		04/2004
Complete imaging of entire collection	06/2004		03/2004
Deploy CIS software	09/2003		04/2006
Acquire Web content management system	08/2003		02/2002
Migrate Move information system legacy data into CIS	03/2003		05/2006
Migrate data from Photo Archives system into CIS	05/2003		05/2006
Research thesaurus & classification systems; implement initial culture thesaurus system	12/2001		10/2006
Provide public access to selected CIS data available on Web	01/2007	02/2009	
Develop and implement standardized thesauri & classification terms across collections-related systems	09/2007	09/2009	
Implement use of CIS for all exhibition content for major museum initiatives	12/2008	04/2010	

c. Benefits

Collections information, as a primary means of documenting and understanding the collections, is one of the NMAI's primary responsibilities, holds a central place in the Museum's operations. As such, development and management of collections information and related electronic systems requires both ongoing support from the Museum's senior management and considerable collaboration between departments throughout the Museum, including sets of interdependent responsibilities.

The NMAI captures electronic data about its collections to:

- meet the Smithsonian's mission and stewardship responsibility to preserve its collections and the information inherent in them;
- enhance access to, and ability to do research on its collections;
- enhance informational integrity and value of collections as the foundation for research, exhibitions, publications, and educational programs;
- facilitate legal, physical, and intellectual control over collections; and improve public access to the collections and information about them.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2006	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	NMAI

2.3.4 Castle Collection: OFEO

Line of Business	Sub-function
Education (106)	Cultural & Historic Preservation (017)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)

a. Description

The Architectural History & Historic Preservation (AHHP) Division of the Office of Facilities Engineering & Operations manages the collection of historic furniture, artwork, and decorative art objects located in the Smithsonian Castle. *PastPerfect,* an integrated relational database collection management system designed specifically for small museum collections, is used to automate accessions, loans, cataloging, condition reports, and inventory location control of over 3,000 objects for which AHHP is responsible.

b. Benefits

- Reduced to two or three days the time needed to provide collection objects to customers in the Castle;
- Reduced time spent conducting the bi-annual inventory of collection objects in use and in storage to three weeks;
- Using built-in features, reduces time and redundant effort of creating catalogue cards and accession records;
- Enhances existing public access to the Castle Collection and Castle history through additional online exhibits on the Architectural History and Historic Preservation website.

b. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2001	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	OFEO (Castle Collection)

2.4 Scientific Collections Systems

2.4.1 National Museum of Natural History: Research & Collections Information System (NMNH RCIS)

Line of Business	Sub-function
General Science and Innovation (109)	Science and Technology Research and Innovation (026)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)

a. Description

The National Museum of Natural History (NMNH) has stewardship responsibility for the world's largest museum collection—more than 126 million objects and specimens. It is also one of the most important museum collections, covering seven significant fields of learning—Vertebrate Zoology, Invertebrate Zoology, Entomology, Paleobiology, Botany, Anthropology, and Mineral Sciences—and having been enhanced by knowledge from nearly two centuries of study by the international scientific community. Responsibility for a collection of this magnitude demands that it be managed to the highest standards possible and in a manner that provides enduring public benefit.

The National Research Council study "Funding Smithsonian Scientific Research" emphasized the unique importance of the NMNH collections "The collections at NMNH are vastly larger in size and scope than those of any comparable US institution…. Its breadth of research mission and the extent of its service to the museum research community are correspondingly greater. The support and function of an institution the size of NMNH warrant high national priority for collection-based research that is vital to the accomplishments of an international community devoted to the natural sciences."

Since the late 1960s, the museum has been capturing textual information, and more recently, images in electronic form. NMNH has organized these images into databases and made them accessible to museum staff for collections management, to scientists for research, and to the public for educational, policy, and decision-making purposes. NMNH's Research and Collection Information System (RCIS) has been operational since August 2001 and is based on a commercial software product — KE Software's *Electronic Museum (EMu)* — for multi-media cataloguing. In addition, RCIS uses an in-house developed system — the Transaction Management System — that enables museum staff to manage and track collections. The museum plans to combine the functions into a single system by the end of FY 2010.

RCIS helps the Museum manage collections through desktop processing of transactions relating to acquisitions, loans, borrows, exchanges, and disposals. Each year the museum acquires about 500,000 specimens, disposes of about 68,000, loans about 170,000, and borrows about 327,000. In FY 2002, these loans went to all US states and territories and over 100 foreign countries. Many of the specimens included in these transactions require filing permits with the US Fish & Wildlife Service and other agencies. Permits and other forms, reports, and letters are electronically generated through RCIS, resulting in much more efficient use of staff time.

RCIS provides a central repository for many types of data, the most important of which are:

- Specimen/sample level data (*e.g.,* catalogue and storage data, physical characteristics);
- Collection event/locality data (date, site, geographical location, GIS referencing where available, ecological data from collection notes with look-up to geographical data);
- Biological taxonomy data (the names themselves and their hierarchical relationships, synonymy);
- Thesaurus of culture, artifact, rock, mineral, and gem names (also with associated hierarchical relationships, synonymy);
- Bibliographic and citation data;
- Research data (limited but with attributions for the persons who did the work);
- People and organizations data related to any of the above (*e.g.,* researchers, catalogers, authors, collectors, identifiers).

Currently, NMNH has 5.4 million records and 577,364 digital images in RCIS and plans to complete the migration of more than 5.6 million records from over 22 legacy systems to RCIS, and to make most records publicly available on the Web in FY 2009. About 50 million records are needed to adequately represent all of the over 126 million objects and specimens. Presently, the Museum makes accessible more than 5 million records and 575,000 digital images via the Web (http://nhb-acsmith1.si.edu/) for universities around the globe, students of all ages, scientists from all disciplines, U.S. Government departments, and foreign governments.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Transaction Management implementation & migration to *EMu*			
Establish RCIS ™ Project Team			04/1993
Deploy TM in first unit (TM version 1.0)			09/1995
Complete deployment in units (TM version 3.0)			01/1999
Deploy annual statistics function (TM version 4.0)			12/2000
Requirements specification for migration of TM function and data to KE *EMu*	07/2003		06/2005
TM client implementation and data migration to *EMu* complete (75,000 transactions include 87 million transacted items)	06/2005	12/2010	
Complete MCS client implementation & data migration for			
Establishing RCIS (MCS) Project Team			08/1995
Deploy *EMu* version 1.0 for initial production processing	05/2001		08/2001
Invertebrate Zoology SELGEM catalogue records (786,000)	05/2001		08/2001
Mineral Sciences *Paradox* catalogue records (350,000)	10/2001		06/2002
Volcano Reference File *(Paradox)* (100,000)	02/2002	08/2009	
Botany *Inquire* catalogue records (600,000)	10/2002		12/2002
PC research catalogue records (250,000)	08/2002		08/2006
Images (50,000)	08/2006		08/2006
Paleobiology SELGEM catalogue records (572,000)	12/2002		08/2003
PC catalogue records (100,000)	12/2002		12/2007
Vertebrate Zoology *Inquire* catalogue records (1,863,000)	01/2003		04/2003
Anthropology *Inquire* catalogue records (500,000)	10/2002		08/2003
Repatriation Bone Lab records (99,500)	12/2008		10/2008

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Catalogue Card Images (400,000)	08/2004		08/2004
Images (25,000)	08/2004		08/2004
Entomology SELGEM & *Inquire* catalogue records (300,000)	02/2002		12/2006
PC catalogue records (200,000)	02/2002		12/2006
Public Programs (PC database) (12,000)	01/2003	12/2009	
RCIS server upgrade	12/2004		10/2005
Public access to data records:			
Invertebrate Zoology (500,000)	12/2001		12/2001
(286,000)	09/2003		12/2001
Mineral Sciences (300,000)	09/2002		04/2008
(50,000)	09/2003		04/2008
Paleobiology (150,000)	09/2002		04/2008
(100,000)	09/2003		04/2008
(150,000)	09/2004		04/2008
Entomology (250,000)	09/2002	01/2009	09/2008
(150,000)	09/2003	01/2009	09/2008
Botany (500,000)	01/2003		09/2006
(350,000)	09/2003	01/2010	
Vertebrate Zoology (500,000)	09/2003		09/2006
(425,000)	09/2004		09/2006
(500,000)	09/2005		09/2006
(438,000)	09/2006		03/2007
Anthropology (250,000)	09/2003		02/2007
(125,000)	09/2004		02/2007
Public Programs (12,000)	01/2003	12/2009	
Add additional data to *EMu* and make it publicly available (250,000)	09/2003	09/2009	
(350,000)	09/2007	09/2015	
Images publicly available (19,500)	06/2004		09/2007
Combine *EMu* cataloguing & the Transaction Management System functions into a single system	01/2010	12/2010	

c. Benefits

RCIS supports the Smithsonian Institution's strategic goals of Increased Public Engagement, Strengthened Scientific Research, and Enhanced Management Excellence. By fully implementing and maintaining the RCIS, Natural History will improve collections data quality, quantity, and access which in turn will ensure full physical, legal, and intellectual control of the collections and availability of the information to all who need it. The museum also anticipates substantial savings in the costs of research by the scientific community, as well as enhanced productivity in its workforce, through the electronic conduct of research in lieu of paper-based methods.

In addition, the RCIS will improve:

- Collections data by linking identifications and geography to research data in disciplines such as biochemistry, ecology, and physiology which will lead to even greater understanding of the natural world.
- The consistency of data, legibility of records, and reuse of authority lists.
- Collections tracking for increased compliance with collection management and transportation requirements.
- The conduct of museum-based research by using larger sample sizes; completing it more easily and in less time; and allowing different analytical questions.
- Learning for students and the public in general because the heavily illustrated nature of the RCIS makes it useful for teachers and other communicators in classrooms, print, television and the web.
- Policy and decisions related to climate change, biological diversity, land use, conservation, agriculture, and bioterrorism will be better supported with data from the collections.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2001	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	NMNH

2.4.2 Zoological Information Management System (ZIMS)

Line of Business	Sub-function
Natural Resources (117)	Conservation, Marine & Land Management (057)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)
Information & Technology Management (404)	Record Retention (141)

a. Description

The National Zoological Park (NZP) uses software produced, distributed, and managed by the International Species Information System (ISIS) to support specimen record keeping and scientific, conservation-oriented collections management. ISIS is an international, non-profit organization with 825 member zoos and aquaria. NZP currently uses three ISIS software modules to help manage its animal collection. These are the Animal Records Keeping System (ARKS), the Medical Animal Records Keeping System (MedARKS), and the Single Population Analysis Records Keeping System (SPARKS).

ARKS contains information on about 50,000 animal specimens that are or have been at the zoo. NZP staff can access histories, treatments, locations, and other data critical to the management, husbandry, and health of its animals, as well as data provided by other ISIS members. However, the application software is MS DOS-based, technologically obsolete, and difficult to support in a networked environment.

ISIS is developing a web-based global Zoological Information Management System (ZIMS) to replace the current MS DOS-based application software. The American Zoo & Aquarium Association is funding the planning and design phases of the project, while ISIS member institutions are providing funds to support development and ongoing operation. NZP is participating in the project as an alpha adopter of ZIMS, offering both design consultation and testing support. Full funding for the implementation of ZIMS at NZP has not been provided at this time. Future costs will need to include system training for NZP staff, migration and incorporation of secondary data sources, and system access from the field.

The current plan for the ISIS is to release the ZIMS system to the member zoos and aquariums in three phases. Each phase will add new functional areas to the ZIMS system as follows:

1. Phase 1: Basic ZIMS animal records (replaces ARKS in late 2009)
2. Phase 2: ZIMS animal records enhanced for medical data (replaces MEDARKS in 2011)
3. Phase 3: ZIMS scientific and conservation research functions (replaces SPARKS in 2013).

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
ISIS Project Deliverables			
Requirements Specifications / Concept of Operations	2002		2002
RFP released	08/2003		08/2003
Vender selection	12/2003		12/2003
System Design, Subject Area Expertise – Phase 1			
Phase 1	12/2006	12/2009	
Phase 2	12/2011		
Phase 3	12/2013		
Smithsonian Milestones*			
Functional Baseline, Current Processes	01/2008		12/2007
Data cleanup	12/2006		07/2007
Data Model	05/2008		04/2008
ZIMS/Current Architecture Mapping	06/2008		
Phase 1:			
Transition Plan	07/2008	TBD	
Data conversion	12/2007	TBD	
Train testers	03/2006	TBD	
Security Plan	11/2006	TBD	
Disaster/Recovery Plan	11/2006	TBD	
System Testing	04/2006	TBD	
Security Certification & Accreditation	10/2008	TBD	
User manual	12/2006	TBD	
User training	12/2007	TBD	
Deployment	12/2007	TBD	

* Smithsonian milestones are dependent on the ISIS project meeting its milestone schedule.

c. Benefits

The ZIMS database offers a practical tool for global communication of exotic animal welfare policies, disease and epidemic tracking and endangered species fertility research. The ISIS database benefits the entire zoo and conservation community. It also offers the opportunity for more meticulous exhibition research than would data from the NZP alone and expedites access to current animal care and veterinary practices than would be possible with conventional print documentation. ISIS member institutions supply information on individual

collection animals—1.6 million zoo animals—that ISIS database makes available to all members to assist in making husbandry, management, veterinary care and conservation decisions based on a global rather than a local dataset.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2009	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement

2.4.3 NZP Animal Keepers' Report

Line of Business	Sub-function
Natural Resources (117)	Conservation, Marine & Land Management (057)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)
Information & Technology Management (404)	Record Retention (141)

a. Description

Operations at the National Zoo entail a daily regime of coordinated efforts in the areas of animal care, veterinary care and collections management. Daily records concerning diet, behavior, and health affect the overall curatorial management of the collection. It is imperative to the welfare of the animal individual that all information is shared across affected NZP departments so that problem and resolution tracking can be performed. Keeper's Report also provides an invaluable resource for medical and research observation. As a research tool, Keeper's Report offers an audit trail over time concerning animal behaviors and care practices. A third use for these records is to assist the Registrar in the maintenance of animal permanent records. Keeper's Report often documents vital statistics such as animal transfers, arrivals, births and deaths.

Data housed in the NZP Keeper's Report system will augment the ZIMS global database system. The daily use of these tools in tandem will ultimately allow staff to maintain both detail information at the local level and generalized information at the global level.

Plans to enhance the system and make it Web accessible were terminated based on unforeseen changes in the ZIMS project, and limited funding in FY08. As resources become available, NZP will seek to update Keeper Reports to embrace newer Web technologies and IT security practices.

b. Benefits

The Keeper's Report provides a chronological history of events and behaviors for animal individuals that are relevant to scientific researchers and in some instances genetic researchers. Accreditation by the American Zoological Association requires that members support accurate and complete record keeping for all collections animals. The Keeper's Report system is aligned with those standards and supports accreditation at NZP.

c. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	1990s	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	NZP

2.4.4 NZP MedArks

Line of Business	Sub-function
Natural Resources (117)	Conservation, Marine & Land Management (057)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)
Information & Technology Management (404)	Record Retention (141)

b. Description

MedARKS supports the veterinary health records for the NZP collection. An International Species Information Systems (ISIS) product that is DOS-based and has outlived its productive life, MedARKS is scheduled to be replaced by ZIMS in that project's second release, approximately 2011.

As a stop-gap measure to stabilize this production system, NZP is performing a direct translation of the MEDARKS system into the MS SQL environment. This web-based translation will move the existing data and reporting functions into an environment similar to the ZIMS architecture, but provide no new functionality or reporting capabilities. The intention of this effort is two-fold: to stabilize the weak and constantly failing production system and reduce the impact of the migration to the new ZIMS environment. The project will also satisfy IT security requirements (FISMA) that will bring the system into better alignment with federal regulations.

b. Major Milestones*

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
MEDARKS System Evaluation	04/2008		04/2008
MEDARKS System Translation Design	06/2008		06/2008
IT Technical/Security Reviews	03/2009		
System Software Translation	07/2009		
Data Migration	07/2009		
Translation system Testing	09/2009		
System Training/Documentation	11/2009		

* Projected dates assume that the project will continue to receive funding in FY 2009.

c. Benefits

Production system will be stabilized to protect the data to meet day-to-day needs, as well as ensure its availability for later import into ZIMS once the new ISIS system is available.

d. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	*2009 (planned)*
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• NZP

2.4.5 Orchid Collections Management System

Line of Business	Sub-function
General Science and Innovation (109)	Science and Technology Research and Innovation (026)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)

a. Description

BG-BASE is a relational database application specifically designed to manage biological information on living plant collections, preserved collections, propagation, bibliography, images, distributions, contacts, conservation, DNA sequences, events, and education programs. The Horticulture Services Division (HSD) is implementing it to manage its orchid collection information.

One of the most important and central features of any database dealing with biological material is its ability to handle scientific names. Scientific nomenclature and taxonomy are inherently complex and require a sophisticated and robust data structure to cope with the many rules and recommendations set out in the various codes of nomenclature. In BG-BASE, they are handled by a series of fields and tables covering taxonomic ranks from kingdoms down to subforms, grexes, and cultivars. Both plant and animal names, as well as names of most microorganisms, can be handled. For most purposes, it is the FAMILIES, GENERA, and NAMES tables that are the most important. The various rules of nomenclature as laid out in the International Code of Botanical Nomenclature (Greuter, et al. 2000.) and the International Code of Nomenclature for Cultivated Plants (Brickell, et al. 2004.) have been incorporated in BG-BASE as appropriate. Despite its adherence to nomenclatural rules as noted above, the system still allows users to vary how scientific names appear - whether the scientific author appears as part of the name, the abbreviation (ssp. vs. subsp.) used for subspecies, the format (cv. vs. '') used for cultivars, etc.

Putting collection information into a computerized database, such as *BG-Bas*e, aids in ensuring the efficient, consistent, permanent, and accessible keeping of the information in its records. As an educational tool, the application assists HSD in providing detailed information to the public on orchid specimens and exchanging information with public gardens around the world.

Such a system is essential to having accurate information on orchid specimens. It provides quick reports that aid in prioritizing development or reduction of specimens within the collection and in formulating budgets.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Collection completely accessioned	09/2010	01/2010	

c. Benefits

- Improved access to information on the orchid collection.
- Assists in production of annual orchid exhibition by providing details on collection specimens.
- Enhances accessibility of collections data to public gardens and other institutions.
- Modernization of the gathering and keeping of orchid collection documentation.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	1990s	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	HSD

CHAPTER 3
SCIENTIFIC RESEARCH PROGRAM AREA

3.1 Overview

In the *Programme of Organization of the Smithsonian Institution* that the first Secretary, Joseph Henry, presented to the Board of Regents in 1847, he proposed increasing knowledge by "[appropriating] annually a portion of the income for particular researches, under the direction of suitable persons." The framework of the contemporary research enterprise at the Institution is visible and echoed in Secretary Henry's examples of *objects for which appropriations* may be made:

- Explorations in descriptive natural history, and geological, magnetical and topographical surveys, to collect materials for the formation of a Physical Atlas of the United States.
- Solution of experimental problems, such as new determination of the weight of the earth, of the velocity of electricity and light; chemical analyses of soils and plants; collections and publications of articles of science, accumulated in the offices of government.
- Institution of statistical inquiries with reference to physical, moral, and political subjects.
- Historical research and accurate surveys of places celebrated in American history.
- Ethnological researches, particularly with reference to the different human races in North America; also explorations and accurate surveys of the mounds and other remains of the ancient people of our country.

Dependent first and foremost on the minds of the men and women who pursue ideas—Secretary Henry's suitable persons—Smithsonian research, while rooted in the massive collections described earlier, also depends on sophisticated instrumentation at multiple sites around the world for research in astrophysics and biodiversity and to enhance information in the collections of objects and specimens of science, history, and art held by the Smithsonian at large.

Invariably, however, and common to every field of inquiry, the key to research today is a robust and reliable IT infrastructure in which data can be developed, manipulated, stored, shared, formed into knowledge, and distributed widely.

The January 2003 report of the Science Commission to the Board of Regents recommended that the Institution focus its science resources in the four areas in which it has unique and outstanding research capabilities:

1. The origin and nature of the universe;
2. The formation and evolution of the Earth and similar planets;
3. Discovering and understanding life's diversity;
4. The study of human diversity and culture change.

For the benefit of the scientific community and the public, it also recommended that the Smithsonian:

- Develop the intellectual component of its collections by conducting collections-based studies that enhance existing databases, create new databases, and increase potential uses of the collections.
- Aggressively make use of digitization and Internet technologies to expand the reach of Smithsonian science and make its collections more available.
- Support expanded resources for Web tools essential to maintaining the quality of its research.

During Secretary Clough's Installation speech in January 2009 he stated that:

> *Through the long-standing efforts of our scientists, the Smithsonian has been among the leaders in understanding climate change and biodiversity issues. Now we need to take two more steps. The first recognizes that these problems are not simple, and that communicating the complex science behind the dynamic processes is difficult, but necessary. Now is the time for the Smithsonian to extend its reach by communicating the research in such a way so that our political leaders and the public can understand it, so that global action can be mobilized to help our planet become more sustainable. This will position the Smithsonian to increase the impact of the remarkable efforts of our scientists. The second step is to bring our world-wide commitment to sustainability to our doorstep. We will commit to an overarching approach to sustainability for our museums and facilities here on the Mall and wherever in the world the Smithsonian has a footprint or a building.*

During the planning period, the Smithsonian will develop an aggressive plan to house, preserve, and distribute scientific information and data that are the foundation of science, and to pursue the funding required to implement such a plan.

Initiated in early FY 2008, the Office of Policy and Analysis conducted a scientific IT needs assessment across all Smithsonian scientific units at the Chief Information Officer's request which provides insight into additional requirements for enterprise IT solutions. A key need is the establishment of a Scientific Cyber-Infrastructure that will:

- Create an index of existing data sets that are publicly available to the research communities;
- Create a collection of data sets and manage these in the same manner as a collection of objects and artifacts;
- Develop a plan for the digital preservation and curation of digital data sets;
- Aggressively make available the data sets produced and stored at the Institution;
- Create a portal that allows seamless access and search capability for stored data sets;
- Create a dedicated IT infrastructure that will house the collections of data.

The largest portion of the Smithsonian's budget dedicated to research supports a cadre of productive, world-renowned men and women eager to fulfill the recommendations of the Science Commission and realize all of these goals. Doing so, however, depends crucially on scientists having appropriate tools and technology to conduct and analyze their research.

Program Area Snapshot: Scientific Research
LOB: General Science & Innovation (109); Natural Resources (117); Knowledge Creation & Management (202)

Retired	Production (2009)	Planned (2010 to 2014)	
		Funded	Unfunded
• N/A	*Target Architecture:* • Smithsonian Research Online • STRI Visitor Application System • Statistical Analysis Systems • SAO Scientific Computing Infrastructure • SERC Computing Infrastructure • STRI Scientific Infrastructure *Candidate for Replacement:* • Natural Science GIS (Stand-alone)	• SAO Hydra HPCC	• GIS (Integrated) • Smithsonian Institution DataNet • SERC Research Data Collection • STRI Tropical Biology Database • High Performance Computing Cluster (1024 node)

Future Considerations / Performance Gaps

- Data sets are being maintained and stored traditionally by the scientist for specifically the scientist's purpose. In some cases the data is stored in discipline specific repositories hosted outside of the Institution.
- The Smithsonian, like many other institutions and universities, will need to provide enterprise storage for excessively large datasets (tera and petabytes in size), and will need to develop the systems and protocols to access and maintain these data over decades.
- The scientific community will need to develop standards and descriptive metadata that will keep the data sets intelligible and promote reuse of the data beyond its original intent as the field of e-science grows and the barriers between specific scientific disciplines dissolve.
- The Smithsonian needs a High Performance Computing Cluster (HPCC) on a scale of 1024+ nodes to meet the demand by scientists at several Smithsonian research units. Current research efforts are hampered by the cobbled together HPCC clusters with their

limited availability, support, and computing power.

3.2 Geographic Information System (GIS)

3.2.1 Smithsonian Institution GIS (Integrated)

Line of Business	Sub-function
General Science & Innovation (109)	Science & Technological Research & Innovation (026)
Knowledge Creation & Management (202)	Research & Development (069)

a. Description

The Smithsonian relies increasingly on geographic information system (GIS) tools to conduct scientific research. Geographic location constitutes the framework for interpreting the health of the environment, cultural interactions, animal behavior, and other important knowledge. Annotating scientific information with the geographic location to which it corresponds allows better and faster evaluation of data collected.

A GIS organizes geographically referenced information into a visual form. It can combine map, satellite, and sensor information sources with spatial databases for spatial and temporal analyses that otherwise would be difficult. It also automates most of the archiving and display operations typically required to interpret data obtained in a geographic context. GIS databases constitute baseline data, the worth of which increases with reuse.

The Under Secretary for Science has proposed creation of a pan-Institutional scientific GIS to consolidate existing GIS systems, and employ multi-unit management efficiencies. The Smithsonian Institution Geographic Information System (SIGIS) will help scientists throughout the Institution acquire, analyze, and manage information resources relating to topographic features from sites of specific research interest and integrate that information with other forms of data collected at the same sites. It also will help scientists analyze and understand natural systems and how they are affected by change. Finally, SIGIS will permit conservation and wildlife biologists, as well as ecologists, to expand their field expertise and cover vast regions by using selective sampling and incorporating satellite imagery with topographic information.

The Smithsonian recognizes that one of the most effective ways to maximize the utility of the data collected by its scientists and researchers is to develop tools and capacities that permit not only the integration of its own data, but also the integration of these data with other non-Smithsonian data sets. A Smithsonian-wide GIS can be used to integrate data gathered from individuals, provide an end-to-end system for analysis of multitudes of data

fields, and facilitate the integration of Smithsonian data with other regional and global data sets through partnered data sharing agreements in addition to facilitating the sharing of data between Smithsonian scientists and researchers.

b. Milestones

TBD

c. Benefits

Currently, there are many individual installations of GIS software throughout the Smithsonian. This non-integrated implementation of GISs hinders productivity by fostering an environment that has researchers and scientists working in isolation. It also endangers the preservation of this data due to personnel turnover, lack of training, and limited personnel, hardware and software resources. Migrating from the current individual GIS software implementations to the proposed Smithsonian-wide GIS will provide a shared resource of a centrally supported and integrated GIS, and magnify the benefits of:

- **Effectiveness:** Not only will scientists be able to complete research more efficiently, it will enable research that would otherwise be impossible due to the complexity and spatial scale. Scientists will be able to analyze data with a greater number of variables, in larger volumes, and from many sites.

- **Improved Data Quality**: A Smithsonian-wide GIS supports the reuse and repurposing of data. Every time data are reused or shared, the value of the investment in obtaining it multiplies. Additionally, a robust scientific archiving and database process will mean that more data are kept in a well-organized and well-protected fashion, and more readily accessed by a much larger community of interest.

- **Reduced overall cost:** A Smithsonian-wide GIS will eliminate the need for individual scientists to separately plan, manage, configure, and maintain GIS applications and services.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:	TBD	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

3.2.2 Natural Science GIS (Stand-alone)

Line of Business	Sub-function
General Science & Innovation (109)	Science & Technological Research & Innovation (026)
Knowledge Creation & Management (202)	Research & Development (069)

a. Description

The Smithsonian relies increasingly on geographic information system (GIS) tools to conduct scientific research. Annotating scientific information with the geographic location to which it corresponds allows better and faster evaluation of data collected.

A GIS organizes geographically referenced information into a visual form. It can combine map, satellite, and sensor information sources with spatial databases for spatial and temporal analyses that otherwise would be difficult. It also automates most of the archiving and display operations typically required to interpret data obtained in a geographic context. GIS databases constitute baseline data, the worth of which increases with reuse.

The precise location of an activity or event is central to many research projects at the National Museum of Natural History (NMNH), Smithsonian Tropical Research Institute (STRI), Smithsonian Environmental Research Center (SERC), the National Museum of the American Indian (NMAI), and the National Zoological Park (NZP) in its Amazonia exhibition at the Rock Creek site in Washington DC.

The NZP's Conservation & Research Center (CRC) at Front Royal, Virginia uses advanced spatial analysis technologies along with GIS, satellite imagery, and satellite-tracking devices for studies related to the conservation of endangered species and their habitat. Research projects include:

- Countrywide land-cover change studies in Burma to delineate remaining tiger and elephant habitats, while monitoring their movements in the wild;
- Analyses of endangered bird habitat in the Smithsonian Migratory Bird Center;
- A spatial analysis of West Nile virus expansion;
- Using satellite biomass estimates to predict migratory movements of the endangered Mongolian gazelle;
- Monitoring and assessment of migratory birds;
- Spatial analyses in the Monitoring and Assessment of Biodiversity program, especially in the tropical environment of Gabon.

Smithsonian Environmental Research Center (SERC) scientists use GIS tools for the following:

- To monitor nutrient sediment discharges and shoreline changes around the Chesapeake Bay;
- A long-term study within the Marine Invasions Program;
- A study of the importance of understanding ecological complexity to predicting effects of multiple stressors on coastal systems.

STRI researchers expect to use them for ecological projects such as:

- Analyses of botanical censuses of Barro Colorado Island;
- 3-D analyses of bird and freshwater fish distributions;
- Comparative botanical analyses of other tropical forest plots around the world;
- Predicting the impacts of planned highways and infrastructure projects on Amazonian forests, using GIS modeling;
- Biological Diversity of Forest Fragments project.

Scientists at NMNH conduct many studies using GIS including:

- Current and paleobiological species distributions;
- Perform archeological site analyses, as well as paleolandscape studies;
- Mapping and analyses of human culture patterns;
- Spatial analyses of genetic diversity;
- Studies of biogeography and biodiversity in the neotropics;
- Development of the Ocean Geo-Portal;
- Animated mapping of volcanic and seismic occurrences over time.

NMAI researchers manage studies using GIS comprising:

- Current and historical analyses of western hemisphere cultural distributions, languages, environments and indigenous geography;
- Spatial analyses of mapped treaty boundaries through the Digital Atlas of Indian Territories and Treaties.

Scientists at the Center for Earth & Planetary Studies at the National Air & Space Museum are working on a variety of GIS and remote sensing projects that include:

- Geologic mapping and analysis of Venus, Mars, and other planets;
- A land-cover/geologic study of the Mpala Ranch in central Kenya;
- Global positioning system surveys of the topography of lava flows around Mount Lassen in California;
- Volcano movement and measurement in the highlands of southern Peru.

A GIS requires capital investment in staff and equipment in order to make the most of the technology. Initial funding will be used for equipment to establish a world-class GIS training and development lab and environment at the NMNH. This approach will support a senior Smithsonian scientist in becoming a fully authorized GIS instructor in order to train other Smithsonian staff in the use of the lab and the software.

b. Benefits

A GIS organizes geographically referenced information into a visual form. It can combine map, satellite, and sensor information sources with spatial databases for spatial and temporal analyses that otherwise would be difficult. It also automates most of the archiving and display operations typically required to interpret data obtained in a geographic context. GIS databases constitute baseline data, the worth of which increases with reuse.

c. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	1991
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• NASM • NZP • NMAI • STRI • NMNH • SERC

3.3 Scientific Digital Asset Management

3.3.1 Smithsonian Institution DataNet

Line of Business	Sub-function
General Science & Innovation (109)	Science & Technological Research & Innovation (026)
Knowledge Creation & Management (202)	Research & Development (069)

a. Description

The world of Science, Research, Engineering and Education are increasingly digital and increasingly data-intensive. Currently there is no central repository for Smithsonian scientific data. Instead much of it is kept on the scientist's hard drive or non-archival CDs and DVDs. In order for scientists to understand, interpret and use data collected by another researcher it must be cataloged with description, indexed and stored in such a manner that it is easily recoverable. Among the worldwide scientific community there is a growing need to develop scientific curation policies, procedures and systems to preserve data for the long term—centuries versus years. Any such polices and systems would need to address accessing this data interoperable to cut across not only data sets, but also across disciplines.

The digitized data that is the product of current and future research activities can be used as the basis for new hypothesis and research. This extension of one research activity to another and the reuse of the digital products or data sets represents a challenge to the scientific community, to manage the provenance, provide interoperability, and ultimately maintain the structure and integrity of the data sets. The Smithsonian proposed DataNet will make available data-sets to the public in an easily accessible manner whether it is another scientist, an elementary science class, or an amateur scientist. The data sets will be managed in such a manner as a collection of objects, that they can be stored and retrieved in a variety of digital formats through time and technology changes.

The Smithsonian's Data Center in Herndon will house the proposed enterprise digital repository including both near-line and archival storage, provide the staff to care for it, develop mirrored sites and traditional offsite storage, and methods to securely access and disseminate the data sets.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Implement an archival storage	TBD	08/2009	
Migrate existing data sets at risk into the storage with minimal metadata	TBD	10/2009	
Pilot Datasets:			
Develop interoperable standards for data reuse	07/2010		
Perform data cleanup	07/2011		
Develop a mirror site	07/2012		
Develop a secure web-based access portal	12/2013		
Implement Trust Digital Repository Policies and Procedures	12/2013		

c. Benefits

Currently there is not central repository of Science related data sets. There are many niche sites that hold data sets related to the activity of that particular organization. In some cases data that has been used in support of published works languishes on CD, tape, or diskettes in an office. The benefits of building a cyber-infrastructure are:

- **Preservation:** The curation of data sets in such a way that the information contained is readily available to future generations of researchers. The data is kept in a universally usable format, with all Meta data information kept intact. The provenances of the data sets are protected.

- **Automation:** The automation of scientific instrumentation and data collection across all disciplines.

- **Effectiveness:** Not only will scientists be able to complete research more efficiently, it will enable research to reuse or repurpose data across disciplines that would otherwise be impossible due to the complexity and non-standard formats. Scientists will be able to analyze data with a greater number of variables, in larger volumes, and from many sites and at a reduced cost.

- **Improved Data Quality**: An International/National data set repository that supports the reuse and repurposing of data. Every time data are reused or shared, the value of the investment in obtaining it multiplies. Additionally, a robust scientific archiving, formatting, and database process will mean that more data sets are kept in a well-organized and well-protected fashion, and more readily accessed by a much larger community of interest over period of time that will be measured in centuries.

- **Reduced overall cost:** An International/National repository or collection of data sets will eliminate the need for individual scientists to separately plan, manage, configure, and maintain applications and services.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	TBD	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide Science Units

3.3.2 Smithsonian Research Online

Line of Business	Sub-function
General Science & Innovation (109)	Science & Technological Research & Innovation (026)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)

a. Description

The Smithsonian Research Online (SRO), formerly the Smithsonian Digital Document Repository, collects, stores, and provides access to research works including digitized text, associated images, and data sets—both published and unpublished. The program unifies the two existing programs: the Smithsonian Research Bibliography which contains descriptive metadata for research publications by Smithsonian scholars, and the Smithsonian Digital Repository which contains the digital publication itself. Examples of scientific content served via SRO in the repository include articles, preprints, working papers, technical reports, conference papers, books, theses, and data sets.

In addition, the SRO:

- Provides access to the research publications of the whole Institution through one interface;

- Captures publication information either via publisher websites or as entered directly by the Smithsonian author;

- Supports efficient Institutional management of digital content and reporting of scholarly publishing activities;

- Provides standard conversion and metadata services for all content;

- Manages digital preservation (i.e., long-term physical storage), handling, and protection of digital items in a secure environment.

The SRO program includes:

1. An SQL database and Web server containing descriptive and administrative information about the research publications authored by Smithsonian staff and affiliates. This website is publicly available, and includes not only search and display but a set of data entry forms for authors to enter new publication data.

2. The implementation of an open source software application (currently DSpace) designed to support capture, description, and distribution of digital assets on the Web through a search and retrieval system. There are two servers located at the Smithsonian Data Center which run the Dspace repository application and which contain the digital version of Smithsonian publications. These servers are mirrored nightly with one being in the DMZ and the other available only to those on the SI network.

SRO implementation was built towards the proposed, but currently unfunded, digital infrastructure including a metadata repository built to Dublin Core standards. This will ensure that repository data and functions can be integrated with those of other Smithsonian disciplines, implemented incrementally in support of science unit program objectives, and leveraged to allow the Institution to participate in broader external science and research activities.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
TRB Approval	09/2006		09/2006
Configure Server & Network	10/2006		12/2006
Establish backup/mirror routine	01/2007		06/2007
Coordinate SDR content with the newly-formed Smithsonian Research Bibliography	10/2008		06/2008
Submit metadata for integration into the SIRIS Cross-Searching Index	01/2009		01/2009

c. Benefits

In response to recommendations related to several elements of the Science Commission report, the Under Secretary for Science, together with the Director, Smithsonian

Institution Libraries, has implemented a Smithsonian Research Bibliography. This effort supports the previously-established Smithsonian Digital Repository in that an accurate picture of research publications is created in order to guide the collection of digital editions. This research repository will allow the Institution to:

- Manage, preserve, archive, and make accessible its digital scholarly output;
- Assure that its investment in such projects is protected and appropriately leveraged;
- Enhance the image of Smithsonian scholarship within the worldwide research community.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2006	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	All research units

3.3.3 SERC Research Data Collection Initiative

Line of Business	Sub-function
Natural Resources (117)	Conservation, Marine & Land Management (057)
Knowledge Creation & Management (202)	Research & Development (069)

a. Description

The Smithsonian Environmental Research Center (SERC) is a global leader for research focused on connections between land and water ecosystems known as coastal zones. Coastal zones form the stage upon which the 21st century's biggest environmental challenges will be confronted. Located on the Chesapeake Bay, SERC's diverse staff of 17 senior scientists and a large interdisciplinary team of more than 180 researchers, technicians, and students conduct long-term research that cuts across traditional disciplinary boundaries and extends to the world's seven continents and four major oceans. Studies range from the impact and effects of global climate change, to the effects of nutrients and chemicals passing through our landscapes on the maintenance of productive fisheries, changes to our environment from biological invaders, or protection of fragile wetlands and woodlands. The interdisciplinary research at SERC applies long-term studies to examine ecological questions about coastal zone landscapes of linked ecosystems, especially those impacted by human activities, with the ultimate goal of providing guidance for the improved stewardship of the biosphere.

Research data collected by SERC scientists are currently maintained in a variety of electronic media stored on servers, individual scientists' computers, and in paper files. This diversity of formats prevents data sharing or dissemination beyond a small community of users, thus severely limiting its scientific use or impact. As with any Smithsonian collection, research data are invaluable and cannot ever be replaced if lost or destroyed. In addition, without standard metadata tags that identify the "how, when, where, why, and by whom the data were collected" interpretation of the data depends on the most vulnerable resource of all—the human scientist. When a scientist departs, field notes are lost; or when a natural or other disaster strikes, the scientist's knowledge and his/her research data can be lost as well if they are not properly categorized and stored and made safe for future generations.

To preserve and protect its research data in the most logical and effective way, SERC must actively manage existing data files including their conversion from disparate outdated file formats and media into a central repository. In addition, SERC must also complete the metadata "dictionary" for each data set to support current and future exploitation of these critical ecological data for new analyses beyond the aims of the original measurements. Applications such as retrospective analysis or computer simulation models increasingly mine old data such as these for new purposes thereby enhancing the long-term value of research data and improving current availability and usefulness to others, both inside and outside of the Institution.

With adequate funding in place to provide a full time data/Web manager (in the broadest sense of the word), SERC will resurrect the brief 2-year SERC *Research Data Collection Initiative* initiated in 2001 that was stopped due to lack of funding. The initial effort succeeded in making some data available through SERC's intranet and public websites as well as a National Biological Information Infrastructure (NBII) data clearinghouse site; developed an initial metadata schema; and developed a prototype for organizing and searching a centralized relational database.

b. Major Milestones

TBD

c. Benefits

The continually growing pool of coastal zone research data is the priceless product of four decades of ongoing research. Adequate funding will ensure that:

- data are effectively managed to maximize the possibilities for present analysis by Smithsonian scientists;
- data are shared with research collaborators around the world to address issues of societal importance;
- data are preserved for use by future scientists;
- future data mining demands are met;
- future education and outreach programs are based upon supportable facts;
- SERC is able to meet mandates from Congress and external funding agencies to provide public access to data in a meaningful format that will persist through time.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:	TBD	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SERC

3.3.4 STRI Tropical Biology Database

Line of Business	Sub-function
Natural Resources (117)	Conservation, Marine & Land Management (057)
Knowledge Creation & Management (202)	Research & Development (069)

a. Description

All STRI research projects need to collect, store, and provide effective access to their data. Since formed in FY 2006, STRI's Office of Bioinformatics (OBio) is responsible for building and managing a centralized data repository. The OBio is responsible for identifying potential databases, storing them in standard formats, and making them available through the OBio's website. This website not only provides direct user access to datasets, but also provides a range of query, mapping and integration tools to permit their on-line inspection and analysis.

While a number of important data sets have already been gathered from a variety of research projects, they represent only a small fraction of the data still in the hands of individual scientists. These files are maintained in a variety of electronic and paper and in a wide range of formats. Furthermore, research projects continue to accumulate data faster than the OBio can currently capture and publish it. If a scientist departs the Institution, the data is generally not available for other research projects because it is not captured or maintained in formats that facilitate data sharing or dissemination beyond a small community of users. Many of these data sets will wait until publication before most scientists are even willing to consider putting their data into the public domain. Most scientists, however, would be willing to immediately publish Metadata (data about data) about their data so that people can be made aware of what data has been collected and by whom – if the facilities and personnel were available to assist this effort.

STRI, both institutionally and individually by scientist, possesses a unique and invaluable collection of slides and photographs documenting both the science and the scientists of scientific research in Panama. These images document science, scientists, locations and organisms throughout Panama for over 100 years. Many of these images (tens of thousands) still need to be digitized. Almost all of them await the creation of proper metadata before they can be put on-line. These images will be of interest to a wide range of people including students, researchers, historians, and the general public.

STRI hosts some of Panama's most important biological collections. These collections include plants, insects, reptiles and amphibians. Work has already begun on capturing the collection tag information for all of these collections, as well as geo-referencing site localities. Little progress has been made on photographing these collections. Specimen data and photographs will be an

invaluable resource to STRI scientists, as well as scientists throughout the world, for species identification, studies on biodiversity, ecology and taxonomy.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Implement an Office of Bioinformatics	04/2006		04/2006
Initiation of GIS capabilities within the OBio	6/2007		04/2007
Digitization of biological collections	3/2007		3/2007
Initiation of STRI metadata system	10/2007		12/2007
Initiation of Digital File Manager	8/2007		12/2007
Initiation of photo & slide collections digitization	1/2008		1/2008

c. Benefits

Stewardship, preservation, and access to STRI research data that facilitates re-use, e-science, and sharing. The value of scientific databases grows exponentially as they are put on the Web and integrated with other similar, national, regional and global data sets; and as more and more people are able to discover and use them. Collecting, organizing and publishing STRI's scientific data and/or metadata on the internet needs to be a high priority for the Institution.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:	TBD	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	STRI

3.4 Management & Analysis Systems

3.4.1 STRI Visitor Application System

Line of Business	Sub-function
Natural Resources (117)	Conservation, Marine & Land Management (057)
Knowledge Creation & Management (202)	Research & Development (069)

a. Description

Smithsonian Tropical Research Institute (STRI) annually receives more that 600 visiting scientists and students. A Visitors Application System is being developed to help manage the visitors' applications, approval of visits and other logistical requirements.

The Visitors Application System is an online registration system that visiting scientists must complete when requesting to visit and work at STRI as a visiting scientist. It asks for personal information, project information, facilities, labs and equipment that the scientist will need during their work in Panama, the sites (field) he/she will be visiting, as well as other details about the project.

Once the information is entered into the system, STRI staff use it to evaluate the research project or proposed activities. Once the project is approved, STRI notifies the applicant about the availability of space, equipment, and housing; fees; appropriate immigration procedures; and necessary research, collecting and export permits required by the Republic of Panama.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Establish a VSO advisory committee	08/2006		09/2009
Develop Requirements / SOW	09/2006		09/2006
Select the provider	10/2006		10/2006
Development Phase	12/2006		12/2006
Test Phase	01/2007		01/2007
Implementation Phase	02/2007		02/2007
Production Phase	03/2007		03/2007
Maintenance and adjustments	03/2007		12/2008

c. Benefits

The STRI Visitor Application System improves the consistency and completeness of visiting scientist applications which facilitate a more complete review when evaluating that the proposed project falls within STRI's mission. It also eases the administrative burden of supporting such a large number of visiting scientists by creating one database from which multiple reports can be generated including the make-up of the visitors' nationalities, academic level, institutions; usage of STRI facilities for management purposes; and the amount of support provided to international scientific community. It is also used to charge registration and facilities fees to the visitors.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2007	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	STRI

3.4.2 Statistical Analysis Systems

Line of Business	Sub-function
General Science & Innovation (109)	Science & Technological Research & Innovation (026)
Knowledge Creation & Management (202)	Research & Development (069)

a. Description

For statistical, numerical, and exploratory data analysis and presentation the Smithsonian relies on *SAS, Systat*, and *S-plus*. Each of these applications provides an array of statistical/data analysis tools that are used for analyses of data collected by scientists and researchers. These systems make possible a substantial number of research publications from almost all disciplines. *SAS* programs also have been used for Smithsonian-wide telephony and computer-system usage analysis.

SAS consists of nine modules:

1. SAS Base: system coding and basic statistical analysis
2. SAS Graphics system
3. SAS GIS system (graphics information system)

4. SAS ETS (econometrics time series)
5. SAS FSP (GUI design/integration system)
6. SAS AF (applications facility)
7. SAS ASSIST (automated version of system)
8. SAS Stat (advanced statistical analysis)
9. SAS Connect (client-server) software system.

Systat exists in a single module form that has more than 100 statistical, graphics, and data-manipulation sub-modules. *S-plus*, which is similar to *Systat* in its sub-modular construction, fills analytical gaps in *SAS* and *Systat*.

b. Benefits

Centralized access to these tools reduces the burden of Institutional support for them and allows deeply discounted volume pricing in purchasing the software. User groups encourage collaboration and sharing information among units.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	1980s	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	• FGA • NMAH • NMNH	• NZP • STRI • SERC

3.5 Scientific Infrastructure

3.5.1 SAO Scientific Computing Infrastructure

Line of Business	Sub-function
General Science & Innovation (109)	Science & Technological Research & Innovation (026) Space Exploration & Innovation (027)
Knowledge Creation & Management (202)	Research & Development (069)

a. Description

In the decade ahead research at the Smithsonian Astrophysical Observatory (SAO) will focus on fundamental scientific themes:

- **Inflation, Dark Matter and Dark Energy:**
  Working from the standard model of the "Big Bang" some 14 billion years ago, we're investigating the early epoch of inflation and the nature and role of dark matter in the evolution of structure in the Universe. We also seek to understand the nature and properties of the "dark energy" that is speeding up the expansion of the Universe.

- **Galaxies and Black Holes:**
  Soon after the Big Bang, the Universe became a space filled with "stuff:" neutral gas, dark matter, and radiation. After several hundred million years, primitive structures began to form from the first chemical elements, creating the first massive stars and eventually the first galaxies. We want to know how they formed, how they interact, and the processes that create super-massive black holes.

- **Stars and planets:**
  We think we know how stars live and die, but our picture of how stars form to begin with is incomplete. Although astronomers have discovered well over 200 planets in other solar systems, we do not really know what conditions actually produce life. We seek to resolve major uncertainties about the complex processes that lead from clouds of gas and dust to stars, planets, and the emergence of life.

- **Extreme Astrophysics:**
  The most violent and energetic phenomena in the Universe are gamma-ray bursts, the birth of neutron stars or stellar black holes in supernovae, whose huge explosions release the basic elements from which life formed, including us. Because the physical conditions in these phenomena can't be replicated in our Earth-bound labs, we must develop and use new tools to unlock the extreme physics of our Universe.

Data from major new scientific instrumentation programs at SAO—the Submillimeter Array (SMA) and the converted MMT—will play an essential role in addressing these questions. However, state-of-the-art instruments make ever-increasing demands on the computation capabilities of SAO. Without major enhancements, its research programs will quickly bog down. SAO scientists can make efficient use of telescope time only if data processing can keep up with the rate of data acquisition.

Maintaining the scientific eminence of SAO demands a state-of-the-art computing environment that includes:

- The ability to manipulate and reduce large data sets;
- The ability to produce and analyze high resolution images;
- A reliable network;
- Supporting computer services.

The volume of data generated by the new SAO instruments will have to be stored, archived, and made readily accessible to the scientific community at large if the Nation is to realize the full benefits of its investment in astrophysical research. Demands for data storage increase constantly; SAO must be able to backup and archive stored data.

MEGACAM, an instrument for the converted MMT that will have 36 CCDs (charge-coupled devices, each with 2048 x 4608 pixels) is beginning to generate data. It alone will require fifty terabytes of online data storage capacity at all times so that observers can properly analyze their data. Similarly, the volume of data generated by the Submillimeter Array will dwarf that with which SAO scientists have worked in the past.

SAO must provide rapid-access data storage to facilitate analysis of the large sets of data that result from observations at its own and other telescopes. It also must have large-scale data storage arrays to provide workstations and servers high-speed access to data on disks in geographically separate locations, which is equivalent to having the disk directly connected to the local machine.

In addition, SAO must make a substantial and continuing investment in its supporting infrastructure, continually improve its networking and telecommunications infrastructure, and provide and regularly replace email, web, and general purpose servers, as well as database engines. State-of-the-art multiple-processor machines will allow SAO to carry out increasingly sophisticated simulations of astrophysical systems.

b. Major Milestones

Milestones with "TBD" completion dates are currently unfunded.

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Establish a scientific computing advisory committee	05/2002		09/2003
Complete disaster recovery plan	05/2002		12/2004
Develop AIS security plan	12/2002		7/2004
Complete comprehensive IT security plan for SAO	04/2004		7/2004
Complete scientific computing strategic plan	05/2003		04/2006
Implement 5-year replacement cycle for network switches and routers	10/2003	01/2010	
Implement 4-year replacement cycle for all file and compute servers	10/2004	TBD	
Implement large-scale network storage upgrade	06/2005	TBD	
Implement data archival system	06/2009	TBD	
Implement High Performance Computing Cluster	10/2004	TBD	

c. Benefits

The effectiveness of the Scientific Computing Project at SAO will be assessed by how well it allows the staff to carry out its mandate for leadership in basic astronomy and astrophysics, as well as to make information accessible to the astronomical research community and the public. Without the proper infrastructure, SAO will find it difficult to maintain its existing science programs and take advantage of new opportunities when they present themselves.

d. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	TBD
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SAO

3.5.2 SERC Computing Infrastructure

Line of Business	Sub-function
General Science & Innovation (109)	Science & Technological Research & Innovation (026)
Knowledge Creation & Management (202)	Research & Development (069)

a. Description

Most SERC data are long-term collections drawn from the lands and ecological communities of which it is steward. However, these collections also contain invaluable information on approximately 50,000 specimens related to the Marine Invasions Program, a collection of living plants in its greenhouses, and data from seven continents and the four major oceans.

Currently, SERC IT services consist of a communications infrastructure to support telephone and computer activity including:

- Data analysis;
- Document and graphics production and presentation;
- Electronic data acquisition, dissemination, and storage, collaboration;
- Office automation;
- Web and distance-learning tools.

During the past fiscal year in cooperation with OCIO, SERC participated in the Research Computing Initiatives Survey. This effort was mutually beneficial, as it enabled SERC to review and redefine its own needs while providing information for the initiative. SERC has continued a close alignment with the Smithsonian IT initiatives including continued participation in the Information Technology Management Committee and the Computer Security Advisory Committee. New SERC account creation and deletion procedures are coordinated with those of the Smithsonian, and SERC provided considerable documentation needed as OCIO moved to comply with NIST standards for workstations and accounts. As part of the Smithsonian's efforts toward pandemic preparedness, and also to accommodate remote access to WebTA, selected SERC personnel were provided with Citrix accounts and trained in their use.

Use of Video Conferencing is growing at SERC with the purchase of a new PolyCom and its integration into the Smithsonian Video Conferencing bridge. SERC funds were used to expand network infrastructure in the form of new wiring in three buildings and one wireless access point that can access both SI-Net and SI-Guest. Data from two of SERC's servers have been consolidated onto the data clusters in Herndon, and work is underway to define the steps and goals for moving remaining data in a manner satisfactory to both OCIO and SERC. SERC continues to operate its own telephone system on the majority of the campus with VOIP still a few years away.

b. Benefits

The mission for IT support at SERC is to keep SERC scientists at the forefront of their respective disciplines. With an expectation of SERC's sustained annual growth, and the evolution of facilities and programs, SERC's IT program will be required to predict and implement technological advances to assist development of SERC capabilities and more closely align its IT function with in support of its growing programmatic and facility needs.

c. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:		Ongoing
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SERC

3.5.3 STRI Scientific Infrastructure

Line of Business	Sub-function
General Science & Innovation (109)	Science & Technological Research & Innovation (026)
Knowledge Creation & Management (202)	Research & Development (069)

a. Description

Dedicated to studying the past, present, and future of tropical biodiversity and its importance to human welfare, the Smithsonian Tropical Research Institute (STRI) is the world's leading center for studies in tropical biology. Its leadership grows out of the ability of its scientists to pose the right questions, gather and process information that supports advancements in knowledge, and disseminate that information to the scientific community, students, and the general public.

STRI must implement a scientific computing infrastructure in order to leverage information technology to improve data collection and management, data integration for further value-added analysis on the processes that give rise to tropical biodiversity, the factors that determine the maintenance of added analysis on the processes that give rise to richness and the impact of human activities, continue to attract world-class scientists, and improve the quality of data gathered in terms of frequency and precision. Additional computer software is needed to enhance data analysis; and store data electronically for archival, dissemination, and future tropical research projects.

- STRI proposes to implement a Geographic Information System (GIS) to construct an accurate grid and topographic map and to digitize existing, spatially referenced data. The precise location of an activity or event is critical to most STRI research projects, such as those conducted by the Center for Tropical Forest Science, and for archeology and socio-cultural anthropology projects. Precise locations constitute valuable baseline data, the worth of which increases with reuse.

- STRI scientists also need statistical analysis software to support understanding of the data gathered, to test hypotheses, and to validate or refute conclusions and findings. The proposed scientific computing applications can significantly contribute to advancing the Institute's research agenda, reducing time and effort in information gathering and enabling scientists to answer novel questions.

- STRI has identified promising emerging technologies to reduce the cost and time to conduct field research and to support its animal tracking and environmental monitoring projects. New technologies will enable scientists to track animals precisely and gather data in a one-year cycle (rainy and dry seasons) that

otherwise would take a three-year cycle to complete. Research on the tropical forest canopy and in behavioral ecology also will benefit significantly from these technologies.

STRI plans to implement incrementally its scientific computing infrastructure over a multi-year period. Implementing, operating, and enhancing the STRI scientific computing infrastructure will cost about $8.5 million during the planning period, a relatively small amount when compared to the $88 million that will be spent by STRI to support tropical research and a further $21.5 million anticipated from grants by other institutions for research conducted at STRI during the same period. Scientific computing funds will enable STRI to collect more accurate data, make it available for the long term, and disseminate it among wider audiences.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Establish a scientific computing steering committee	02/2002	02/2002	02/2002
Install new radio bases	04/2003		09/2004
Develop AIS security plan	05/2003		05/2004
Develop disaster recovery plan	06/2003		09/2003
Complete scientific computing strategy	09/2003		09/2003
Help Desk services	09/2003		09/2004
Identify tropical biology data standards and formats	09/2004		09/2006
Implement GIS	09/2005		09/2006
Enhance coverage of voice network	09/2005		09/2006
Extend Automated Telemetry System—Phase 1	09/2005		09/2005
Implement Tropical Biology Database	09/2005		10/2007
Implement Environmental Monitoring Sensors	09/2006	TBD	
Extend Automated Telemetry System—Phase 2	09/2007		09/2007
Extend Automated Telemetry System—Phase 3	09/2008	TBD	
Extend Automated Telemetry System—Phase 4	09/2009	TBD	

c. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	STRI

3.5.4 Smithsonian High Performance Computing Cluster

Line of Business	Sub-function
General Science & Innovation (109)	Science & Technological Research & Innovation (026)
Knowledge Creation & Management (202)	Research & Development (069)

a. Description

State-of-the-art instruments make ever-increasing demands on the computation and data storage capabilities at the Smithsonian—especially at the Smithsonian Astrophysical Observatory (SAO) where scientists can make efficient use of telescope time only if data processing can keep up with the rate of data acquisition. Without major enhancements, its research programs will quickly bog down.

The top recommendation of a blue-ribbon committee, whose task was to conduct a comprehensive review of scientific computing and IT infrastructure support at SAO, was to provide hardware and staff support for high-performance computing, both for data reduction and for modeling. Rallied by this recommendation, individual researchers cobbled together an initial High Performance Computing Cluster by combining portions of their grant funds and SAO funds to purchase the initial cluster in FY2004. The same process was followed in FY2005 and FY2006 to acquire the second and third rack. Demand for this cluster exceeds its availability limited by both available computing time and volunteer support staff. System support for the cluster was and continues to be provided on a shoestring budget from the Unix systems group within the IT department.

Elsewhere in the Institution, limited high performance computing is being conducted primarily by NMNH, STRI, and SERC using a variety of computers that range from a small cluster of Mac's to stand-alone pc's. A recent survey of scientific computing needs revealed a need for the HPCC by seven Smithsonian scientific units including the NMNH's Molecular Systematic Lab and Anthropology as examples. The Institution's research contribution toward building the database that contains the genetic sequence of all extant animals and plants in our world eco-system relies on the use of HPC facilities to produce the genomic material as fast as quickly and efficiently as possible.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Training and development HPC	11/ 2008		11/ 2008
Installation of Scientific Storage	12/ 2008		12/ 2008
SAO Hydra HPCC:			
Move SAO Hydra to HDC	07/2009		
Expand Hydra with 14 blades	08/2009		
Increase I2 bandwidth to 1 Gig	02/ 2009		02/ 2009
Increase I1 bandwidth	02/ 2009		02/ 2009

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
1024 node HPCC: Continue to Explore Harvard Blue Gene	TBD		

c. Benefits

The Smithsonian would benefit from the installation of a large (1024 nodes or greater) high performance computing (HPC) cluster installed and maintained in the Smithsonian's Data Center in Herndon which will be available for use by SAO and other SI scientific units.

d. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	*2009 (SAO Hydra)* *TBD (1024 Node HPCC)*
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported; **Units Supported:** **Units Supported:** **Units Supported:**	• STRI • MCI • NZP • NMNH • SERC • NASM • SAO

CHAPTER 4
EXHIBITIONS, EDUCATION, OUTREACH & WEB PROGRAM AREA

4.1 Overview

Joseph Henry, the Institution's first Secretary, viewed the second part of the James Smithson's mandate—the diffusion of knowledge—in the only way he knew: through publications, lectures, and seminars, and by the sea mail exchange of books and journals. Today, practices of scholarship are changing in profound and wide-reaching ways driven by technology that is connecting people to people across organizations, and remotely connecting students and educators thereby affording opportunities not envisioned in John Henry's day.

In the past year, units across the Smithsonian have begun to embrace Web 2.0 social networking opportunities. At the beginning of FY 2009, the Smithsonian had more than 100 presences in sites such as Facebook, YouTube, MySpace, iTunes, Twitter, and Flickr; coinciding with an increasing number of blogs across the Smithsonian, as well as Google Earth mashups. A strategic challenge during this planning period will be to develop a balanced plan for promoting individual Smithsonian unit awareness while harnessing the power of the Smithsonian collections, research and knowledge en masse.

A major shift which we are beginning to experience is that our audience will increasingly want and expect to be active participants with the Smithsonian versus a passive audience, and will want to find the Smithsonian in virtual venues where they already go rather than be forced to Smithsonian websites. In Secretary Clough's installation speech in January 2009 he spoke to how:

> *We need to make our collections, talented scholars and other resources accessible worldwide by providing additional platforms and vehicles for educating and inspiring large audiences. Our job is to authenticate and inform the significance of the collections not to control access to them. It is no longer acceptable for us to share only one percent of our 137 million specimens and artifacts in an age when the Internet has made it possible to share it all. In doing this, the relevance of the Smithsonian to education can be magnified many times over.*

Recent examples of Social Media success stories, conducted in a pan-Institutional manner, to offer transparency, humanity, and responsiveness include:

- Joining the **Flickr Commons**, a site created specifically for photographs from cultural heritage institutions. The Smithsonian Institution was the third member of the Commons and has uploaded more than 1500 of its photographs with no known copyright restrictions. By exposing Smithsonian content within the Flickr environment, the Institution is learning what content is desired by the Web 2.0 world, and how to bring user tags into professionally curated collections. A good example of increased exposure to the images comes from the Smithsonian Libraries' "Portraits of Scientists" set on Flickr. These photographs of 19th and early 20th century scientists and inventors have been available on the Smithsonian Libraries' website since 2003. Though a popular and cited Web resource, in the three months that the photographs have been on Flickr, they have received nearly as many visits as during the previous five years on the Smithsonian site.

- Launched a series of **Smithsonian Education Online Conferences** to reach and sustain a large and diverse audience, and to present pan-institutional interdisciplinary programming. The first conference, with the theme of President Abraham Lincoln was virtually attended by 3,302 participants (696 cities, 13 countries and territories, 6 continents). Approximately 80 percent were K-12 teachers and students. Also participating were university faculty and students, librarians, congressional staff members, and staff of corporations, museums, and federal agencies. The conference was live and interactive; participants were able to ask questions and to share their own knowledge with the Smithsonian presenters and each other. Because the conference content is archived and features an ongoing discussion area and a virtual exhibit hall towards building a long-term community of learners. These conferences are provided as Software as a Service (SaaS) through LearningTimes.

- Launched its first virtual museum in **Second Life** bringing together Latino Collections across the Institution. Through the Smithsonian Latino Virtual Museum, which utilizes the latest media and communication technologies as an avatar-based 3-D virtual learning environment, the Smithsonian has an innovative gateway to provide access to information and resources about Latino/Hispanic history, heritage and American experience in the social and cultural mosaic that is the United States. Within this online environment, we can reach far more people and further explore issues of representation leveraging the success and popularity of interactive experiences particularly with younger audiences. At the same time it affords great creative opportunities to experiment with audience reception and participation in virtual and interactive spaces and galleries; visual representation of collections; new modes of interactive interpretation and display; building on folksonomy and exploring new ways of museum viewing experiences drawing from classical theoreticians in film, and visual culture and museum studies

- Looked for ways to leverage the Smithsonian's presence in social networking sites such as **YouTube** and **Facebook**. On YouTube alone there are more than 3,000 pages tagged Smithsonian reflecting our status as a destination and culture institutions of the United States. A much smaller number of these, only 23, are official Smithsonian pages. An effort is currently underway to convert Smithsonian YouTube channels to YouTube Nonprofits status. This status allows videos of unlimited length (2GB file size limit), and increased branding control of a Smithsonian YouTube homepage.

The Center for the Digital Future at the USC Annenberg School tracked a representative sample of the American population for over seven years, watching as people move on-line and then move from modems to broadband. In 2008, The Center released the report "Surveying the Digital Future" documenting their seven years of longitudinal research which captures broadband at home, the wireless Internet, on-line media, user-generated content and, now, social networking. The result of this study and others can inform the Smithsonian's plans going forward for outreach and education via the Internet and other New Media opportunities. Specifically the project found that:

The Internet as a trusted resource:

- 80% of Internet users age 17 and older consider the Internet to be a more important source of information for them (up from 66% in 2006) and higher than television (68%), radio (63%), and newspapers (63%).
- 83% of users said that most or all of the websites they visit regularly are reliable and accurate.

The Internet as a community

- A large an growing percentage of members in online communities—now 55%-- feel as strongly about their online communities as they do their real-world communities; 54% log into these communities at least once a day; 71% said their community is very important or extremely important to them; and 6% reported meeting their online communities in person.
- Nearly half of online community members said that their community membership is related to their hobbies.
- 63% of adults are uncomfortable with the children in their households participating in online communities. Only 15% of adults are comfortable with children participating in online communities.

Children and the Internet

- The percentage of adults who said that the children in their households spend too much time using the Internet reached 25% of respondents -- an increase for the third year in a row and the highest percentage yet reported in the seven years.
- There are a growing number of adults, for the second year in a row, who said that their children's grades in their household have declined since the household started to use the Internet.
- In a new question for the 2008 study, more than half of adults (53%) said that online predators are a threat to the children in their households. Only 24% of adults with children in their household disagreed with that statement.

The expected growth of Software-as-a-Service (SaaS) offerings will provide additional functionality to deliver Smithsonian content in an agile and flexible manner. Exhibition, outreach, and Web activities support the following line of business and sub-function of the Federal Enterprise Architecture.

Line of Business	Sub-function
Education (106)	Cultural & Historic Exhibition (018) Cultural & Historic Preservation (017)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)

Program Area Snapshot: Exhibitions, Education, Outreach & the Web
LOB: Education (106); Knowledge Creation & Management (202)

Retired	Production (2009)	Planned (2010 to 2014)	
		Funded	Unfunded
• Vista by Ticketmaster (NMAI) • Meeting Room Manager (NMAI)	*Target Architecture:* • TRAX • EDGE • Smithsonian Information Center • Group Reservations and Event Management • Ask Joan of Art • Unit and project websites • Calendaring & Event Mgmt (Trumba SaaS) • SOLAA • Latino Virtual Museum *Candidate for Replacement:* • Info Tools (2011) • Interactive Learning Centers (2010)	• Ocean Portal	• Rebuilding si.edu website • Education Portal

Future Considerations / Performance Gaps

- By leveraging internet technologies the Smithsonian can extend its reach globally for education, exhibition, and outreach; and to remix and combine information in ways not possible within the physical constraints of the world in which we live.
- There is a growing movement to provide high quality open content educational materials and to incorporate participatory learning in the development of these materials.
- The internet is continuing to evolve into a participatory and social networking environment that will extend beyond today's Web 2.0 technologies and virtual spaces such as Second Life. By "participatory" we are emphasizing that the focus will not be just on information access, but also on the role of technology in supporting the social nature of learning.
- The growth of SaaS will provide additional functionality to meet emerging opportunities for exhibition, education, and outreach in a flexible and timely manner.

4.2 Exhibitions

4.2.1 TRAX

a. Description

The Smithsonian Institution Traveling Exhibition Service (SITES) uses TRAX to track between 40 to 50 traveling exhibitions that appear in hundreds of locations each year, as well as the objects within them, many of which have high insurance values. In addition to the collections management function, it provides booking screens that allow users to drill down for information on itineraries, placements and contacts, specific start and end dates, as well as dates on which to ship exhibition-related merchandise and advance materials to support educational programs, local-area fund raising, and public relations.

The TRAX application is the primary exhibition tracking system used by all SITES staff. The original TRAX was a custom-developed application system deployed in 1986 which was replaced in 2006 with a commercial event management software product, Ungerboeck's *Event Business Management System* resulting in staff time savings and an enhanced ability to market exhibitions and publications more effectively. TRAX functionality continues to be enhanced to fulfill all of the initial requirements and additional enhancements are being implemented to meet newly defined requirements as identified by SITES.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Initial evaluation of commercial CIS products	04/2004		04/2004
Develop High Level Architecture	08/2004		08/2004
Document current system Data Model	09/2004		09/2004
Develop Requirement Specification	02/2005		02/2005
Data evaluation & clean-up	09/2005		09/2005
Vendors demonstration	09/2005		09/2005
Install & configure two servers	11/2005		11/2005
Move 2 servers to Herndon, VA	02/2006		05/2006
Develop project plan	01/2006		01/2006
Install & configure the COTS product	03/2006		03/2006
Data migration	05/2006		12/2006
Develop custom reports	08/2006		11/2006
Add field to track REP invoice numbers	11/2006		11/2006
Test security	09/2006		12/2006
Implement training strategy	09/2006		12/2006

Test disaster /recovery	09/2006		12/2006
Acceptance testing	10/2006		12/2006
Enhance 42 CIS reports	10/2009		09/2008
Document how to post CIS reports into TRAX	10/2009		09/2008
Integrate TRAX data with EDGE application system.	04/2008		03/2008
Implement interface between FileMakerPro and TRAX	10/2009	TBD*	
Document Interface and operational procedures	10/2009	TBD*	
Integrate Congressional District	10/2009		11/2008
Integrate SITES Poster Shows into TRAX	02/2009		02/2009
Implement USI's Document Management for TRAX	05/2009		
Upgrade TRAX to Release 17	06/2009		

* Currently unfunded

c. Benefits

By fully implementing a replacement TRAX system, SITES addressed the operational and functional needs for sustaining a robust national outreach profile. The benefits accrued include:

- A reliable and supportable operating platform and application software;
- Cost savings from eliminating time-consuming workarounds,
- Reduced risk of irrecoverable data loss and/or failure to meet Smithsonian field commitments resulting from corrupted or lost data. (Previously the SITES staff had to re-index the 1986 implementation of the database each day to prevent the database from becoming corrupted or displaying data inconsistently in different views.)

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2007	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SITES

4.3 Education and Outreach

4.3.1 Education Data Gathering & Evaluation (EDGE)

a. Description

A major objective of the Smithsonian Education Strategic Plan 2004-2009 was to identify, develop, and disseminate validated systems and models for evaluating the relevance and effectiveness of Smithsonian-based education programs, as well as to assess progress in multiple ways and from multiple perspectives.

Beginning in FY 2005, the Smithsonian Center for Education and Museum Studies and the Smithsonian Council of Education Directors established a three-phase, multi-year approach to evaluating the relevance and effectiveness of Smithsonian-based education programs. This multi-year performance measurements project – Developing Outcomes for Smithsonian Educational Programming – combined quantitative and qualitative methodologies designed to:

- Phase I: Audience Numbers: measure volume and patterns of attendance
- Phase II: Audience Demographics: develop greater understanding of the demographics of participants in educational programming
- Phase III: Audience Outcomes: assess whether and to what degree Smithsonian educational programming has met internal objectives and engendered meaningful change in target audiences

In FY 2005, education departments in 29 units from across the Smithsonian worked together on Phase I of this project, agreeing on a set of standard methodologies to count attendance at, or use of, five types of education programs or resources: tours, audience-drive inquiry (ADI), workshops, presentations, and publications. These counting methodologies, described in the working document *Developing Educational Outcomes for Smithsonian Educational Programming: Methods and Data Collection*, were implemented by the units in FY 2006. Four additional education program/resource types were added to the system in FY 2008: Distance Learning-Interactive Satellite Broadcasts, Distance Learning-Interactive Video Conference, Multi-day Course, and Traveling Exhibition.

The scope of this project does not include a wholesale replacement of existing, customized data collection systems within the units. Rather, EDGE focuses and aligns existing data collection efforts and provides a universal standard against which data can be accurately compared both within and between units and programs. EDGE shall provide a common technological foundation to facilitate education data collection and to capture and report quantitative performance measurement data for units throughout the Smithsonian Institution.

Shortly following the hire by SCEMS in October 2008 of a full-time Education Outcomes Manager, SCEMS combined Phase II (formerly audience demographics) and Phase III (formerly Audience Outcomes) into a new Phase II, Education Outcomes. Recommendations and methodologies for implementing Phase II will be based on analysis of the education data collected by EDGE.

This is a level of effort project that does not have a dedicated funding line. Its current development and future enhancements are completed as funds become available such as lapsed salaries or end-of-year funds or for instance the creative management solution to suspend the publication of an SCEMS magazine for one month.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Implement EDGE	02/2006		08/2006
Provide recommendations for Phase II	10/2006		05/2007
Initiate Education Segment Architecture	01/2007		01/2007
Provide FY 2007 1st Quarter Report[1] on EDGE data to SI Senior Management	02/2007		11/2007
Initiate Phase II, Education Outcomes	10/2008		10/2008
Develop and implement outcome measurement tool(s) in EDGE	10/2009		

c. Benefits

The EDGE system will enable collection of accurate and consistent, quantifiable Smithsonian education data from these nine program types and from other future program types to be defined. It will be the first step toward normalizing education data collection and reporting efforts across the entire Smithsonian Institution. The EDGE approach is based in large part on prior review, assessment, and recommendations relative to evaluating the relevance and effectiveness of Smithsonian-based education programs.

[1] FY2007 EDGE report submitted to OP&A for SI Performance Report update to OMB.

d. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	2006
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• ACM • APAP • FSGA • CFCH • CHNDM • HMSG • HSD • NASM • NMAfA • NMAH • NMAI • NMNH • NPG • NPM • NSRC • NZP • SA • SAAM • SAO • SCEMS • SEEC • SERC • SIL • SITES • SLC • STRI • TSA

4.3.2 Smithsonian Information Center: Visitor Information & Associates' Reception Center

The Smithsonian Information Center (SIC) is the central information and orientation facility for visitors to the National Mall in Washington DC. Its system includes interactive touch-screen kiosks that provide:

- Video highlights and a guide to each museum;
- Visitor services in six languages with open captioning and audio.

Other tools are used to respond to public inquires at museum information desks, the Public Inquiry Telephone and Public Inquiry Mail services. While the program fits the target architecture, the content needs updating. Specifically funding for new video is needed to reflect changes to the museums particularly for the Natural History Museum, the American History Museum, and the Reynolds Center.

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	N/A	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	VIARC

4.3.3 Smithsonian Information Center: Info Tools

Volunteers and staff in the Visitors Information & Associates Center (VIARC) use *Info Tools,* a custom-developed application system first deployed in 1989, to track events, exhibitions, museum hours, tours, and more. The program has undergone many updates and automatically generates data to be used in the above mentioned visitor kiosks as well as serving as a content management system for Web updates. The program generates exhibition, event, and tour pages for the Web as well as printed reports, which allows for the single entry of data with multiple uses. However, this program is written in an obsolete programming language and needs to be replaced.

In FY 2009, much of the information in *Info Tools* will be migrated into the Trumba calendaring Software as a Service application, reducing the reliance on this system. VIARC co-chaired the Smithsonian Pan-Institutional Calendar Technical Working Group in FY 2008 which selected this Trumba calendaring service. VIARC anticipates that *Info Tools* will be retired in FY 2010, unless we

identify any significant gaps between the systems as staff becomes more familiar with Trumba's functionality and ease-of-use.

Funding Status (FY09):	Fully Funded Partially Funded X Not Funded
Production Date:	1989
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• VIARC

4.3.4 Interactive Learning Centers (ILC): National Museum of the American Indian

a. Description

Designed for museum visitors, the Interactive Learning Centers (ILC)—a technology component of the National Museum of the American Indian (NMAI) resource centers—provides access to a wide variety of electronic resources. Each center has a different configuration depending on audience needs. The Resource Center at the George Gustav Heye Center in New York provides access to information resources and answers visitors' questions both on site and online through the Native Information Network project. At the Cultural Resources Center in Suitland, the Resource Center provides training for Native people and access to the museum's rich library and archival resources. At the new museum on the National Mall, NMAI implemented four different spaces each with a different function: Interactive Learning Center (ILC), work study area, classroom, stacks, and staff offices.

The National Mall ILC is a public facing application located on the third floor in the Resource Center. Sixteen kiosks provide a multimedia interface that serve as a gateway to locally based information (about the museum, exhibits, activities, resources, collections, etc.) and approved Internet URLs. Typical users are visiting school groups, tourists, non-academic researchers and Native visitors who are interested in learning what information NMAI has about their communities. A function provided by the ILC is the ability to email postcards, coloring book pages, and selected resources (bibliographies and the results from URL searches).

The ILC runs on the SI Exhibit Zone seven days a week between the hours of 9:00 a.m. and 5:30 p.m. at both the Mall and GGHC locations; and during normal business hours five days a week at the CRC. Kiosk security is provided by *Netkey KioWare*, and Bluecoat softwares. The system is classified as a Class 1 application running on Windows servers with a second standby server to provide redundancy. An integrated search function draws upon an SQL database housed on a Win2K3 server.

We are targeting this system for replacement based on the concern that the current software configuration is outdated and newer technologies could be leveraged to provide the user with more functionality. We are currently conducting market research with a target year replacement for 2011.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Phase 1: ILC installed	09/2004		09/2004
Phase 2: Add new features	11/2005		11/2005
Phase 3: Add new features, deploy to mall museum, NMAI-DC	11/2006		05/2007
Phase 4: Transfer to SI Exhibit Zone, mall museum, NMAI-DC	03/2007		09/2008
Phase 5: Set up ILC client in New York, NMAI-GGHC	03/2007		12/2007
Phase 6: Set up ILC client in Suitland, NMAI-CRC	03/2008		07/2008
Phase 7: Migrate from Sun to Windows Environment	5/2008		08/2008
Phase 8: Begin requirements gathering for redesign of the system architecture	7/2008		07/2008
Phase 9: Retirement`	09/2011		

c. Benefits

The ILC is a public facing program that supports the mission of the NMAI. The mall Resource Center receives approximately 100,000 visitors each year, many of them school groups. The system provides access to over a thousand approved websites of Native interest. The results of targeted Web searches, bibliographies, electronic postcards and coloring pages can be emailed home or to a friend. Interactive maps of the museums display up to date exhibit information for the visitor and NMAI produced video and audio clips are also featured.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	NMAI Mall: 2004 NMAI NY: 2007 NMAI Suitland: 2008	
Enterprise Architecture:		Target Architecture X Candidate for Replacement
Units Supported:	• NMAI	

4.3.5 Group Reservations & Event Management: National Museum of the American Indian

a. Description

The NMAI Group Reservations & Event Management system, *EBMS,* collects and maintains contact information on individuals, groups and organizations such as families, board members, schools, senior centers, tour groups, tour companies, churches, corporations, etc. that make reservations to visit the museum.

The first phase of the Group Reservations & Event Management system was implemented for use by the Education Office's Mall-DC Group Reservations staff to schedule museum visits and tours and to reserve cultural interpreters for the visits. During this phase of the implementation, metropolitan area school addresses and phone numbers—gathered from the most recently published and publicly available documents—were preloaded into the database. Additionally, information about school and group reservations and tours scheduled during the museum's first year of operation which were maintained in a GroupWise calendar were transferred into the new system.

As part of Phase II, NMAI implemented the Group Reservation System in several GGHC offices in 2006—replacing the previously used *Vista* system by Ticket Master.

In Phase III, the system user base has, and will continue to be, expanded to include IRMA and the Special Events staff. All information from the Meeting Room Manager (MRM) system used for room booking at the Mall and CRC facilities was migrated into EBMS.

In Phase IV, we plan to implement iEBMS which is the web-based front end to EMBS. This software is part of our current contract with EBMS and gives us the expanded capability to have staff request meeting rooms via a Web browser via the NMAI Intranet. The next step will be to evaluate implementing the iEBMS software on our Internet website which will give the public the ability to register for workshops and family activities online in addition to their being able to call in and fax their requests. The evaluation will include whether NMAI should instead adopt the Smithsonian's Trumba calendaring software being put into place in FY 2009. The key rationale to use iEBMS in lieu of Trumba would be the direct connectivity to the EBMS database thereby bypassing the need to have some type of interface between Trumba and EBMS.

In Phase IV, we also plan to bring additional users on the system including the Film and Video Center, Cultural Arts, and Media Initiatives. We will work with the GGHC to document their requirements for enhanced system event management tool use.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Phase 1: Implement at NMAI-DC	08/2005		08/2005
Import existing account information	03/2006		07/2006
Phase 2: Implement at NMAI-GGHC			
Education & Scheduling office	04/2006		08/2006
Corporate Membership & Special Events office	06/2006		02/2007
Education / Programs office	06/2006		02/2007
Phase 3: Expand User Base			
Add additional functionality and features for GGHC staff	5/2007		08/2007
Expand system use to CCS and FVC	5/2007	06/2009	
Expand system use to IRMA	6/2007		10/2008
Implement at NMAI-CRC for Collections	12/2007	12/2009	
Implement for NMAI-Mall public spaces by Special Events	04/2008		04/2009
Migrate data from Meeting Room Manager to EBMS. Retire MRM.	4/2009		4/2009
Phase 4: Enhance Functionality and User Base			
Implement Registration	12/2008		7/2008
Implement iEBMS internally	12/2008	05/2009	
Implement for managing CRC staff and public spaces.	05/2009		
Expand use to Media Initiatives	06/2009		

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Expand use to Cultural Arts	10/2009		
Expand use to FVC	12/2009		
Expand GGHC's use of event management tools	09/2009		

c. Benefits

Use of the Group Reservation & Event Management system has already allowed the Reservations staff to establish better business practices that more accurately meet the needs of the Education Office, NMAI, and the Smithsonian. Staff can more effectively and efficiently respond to visitor inquiries; automatically generate confirmation letters, mailing lists, labels; automatically generate more accurate statistics and a variety of canned and custom developed reports. The Group Reservation & Event Management system allows NMAI personnel to be assigned to specific tours. The Cultural Interpreters and Visitor Services staff now has the ability to easily run customized daily calendars that meet their specific needs thereby allowing the Reservations staff to control and limit the dispersal of sensitive and/or confidential data.

In addition, all NMAI staff use the centralized calendar for space usage across our three facilities. This makes it easier to coordinate events because each event profile is in one place and includes all details from inception to conclusion; tools like traces and email offers better internal communication for all event constituents especially when it comes to booking dates and specific rooms; and smooth synchronization and availability of other MS Office tools and software within the program makes it easy to segue from old documents and processes.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2005	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	NMAI

4.3.6 Joan of Art: Smithsonian American Art Museum

a. Description

Begun in 1993, the *Ask Joan of Art*® online reference service is the longest standing arts-based electronic reference service of its kind in the country. As an educational outreach program, *Ask Joan of Art*® serves the Smithsonian Institution's mission of "dedication to public education, national service and scholarship in the arts." The popular question-and-answer reference service is prominently featured on the museum's opening website pages and provides a quick and easy link for anyone to send art questions to an "expert" for reply.

Serving a worldwide audience, *Ask Joan of Art*® answers between 400-500 questions each month. *Ask Joan of Art*® staff research biographical information on artists; help identify and interpret works of art; provide descriptive explanations of terminology; discuss genres, period and themes; list bibliographic references, and refer patrons to sources of information about appraisals, conservation and care of collections, lesson plans and educational programs.

The *Ask Joan of Art*® online reference service uses OCLC's QuestionPoint software to provide the public fast, accurate, and authoritative information on the collections of the Smithsonian American art Museum (SAAM) and on American art in general. The OCLC QuestionPoint software has user-friendly automation tools to assist in answering and tracking questions.

b. Benefits

The OCLC QuestionPoint service allows SAAM to participate in a multi-agency collaborative electronic reference effort with the Library of Congress and other major academic research and public libraries, many of whom have similar needs in terms of responding to questions and may lack the art expertise that SAAM's *Ask Joan of Art*® staff can provide. Through QuestionPoint, other libraries can be automatically referred to the *Ask Joan of Art*® experts.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	1993	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SAAM

4.3.7 Smithsonian On-Line Academic Appointments (SOLAA)

Line of Business	Sub-function
Education (106)	Higher Education (016)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)

a. Description

The Smithsonian Online Academic Appointments (SOLAA) system will provide one common portal and process to accept all academic appointment applications from the public located in the United States and foreign countries; and provide management of the applications by the individual units and central offices across the Institution. In FY 2007, the Smithsonian received an estimated 8,000 applications resulting in over 1,000 internships and about 600 fellowships.

Early in 2001 the Research Training Program (RTP) at the National Museum of Natural History (NMNH) implemented Web-based, automated application and selection processes, which have proven efficient, successful, and well-received by student applicants and by staff reviewers. An updated version of SOLAA became operational in June 2004 for use by NMNH and the Smithsonian Center for Education and Museum Studies. It was determined after analysis that the current SOLAA could not be modified to meet institutional needs for academic appointment processing.

After a Web failure in early 2005, the existing SOLAA system was shut down due to security issues which surfaced during a review of the system. SOLAA was redeveloped to comply with technical standards and guidelines adopted by the Smithsonian – including security precautions.

The new SOLAA, Release 1, provides a Web interface for the public to apply for Smithsonian academic appointments (primarily internships and fellowships) across multiple programs. During the planning period, SOLAA will be expanded to include all academic appointments (visiting scholars, artists in residence, short-term visitors, etc.).

Release 1 went into production for the public in November 2008 and:

- Allows program administrators and coordinators to set up programs
- Authorized staff may search applications using multiple search criteria
- Authorized staff may pre-register persons for designated or nominated appointments
- Authorized staff may set up and approve an appointment
- Authorized staff may enter stipend information

- Referees and reviewers have limited access to the system to perform specific functions
- Provides a secure environment with appropriate backup procedures and privacy notices in place.

Various units are gradually adding their programs into the system as they are trained in the use of the system; not all programs have been added yet. Discussions with the SOLAA Oversight Committee have just begun on the planned second release which will add functionality for staff and enhance some existing functions.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
SOLAA Steering Committee formed	09/2001		09/2001
Complete Concept of Operations	09/2001		09/2001
Accept SOLAA I system from contractor	11/2002		11/2002
SOLAA II operational	10/2002		07/2004
SOLAA Oversight Committee Chartered	04/2004		07/2004
TRB Requirements Review	05/2005		05/2005
SOLAA Oversight Committee approval of Systems Requirement Specifications	02/2006		02/2006
System Design Review by TRB	05/2006		09/2006
Develop application (Phase 1)	01/2007		06/2008
System testing completed	02/2007		07/2008
Production Readiness Review by TRB	03/2007		09/2008
System available for program set up by program coordinators	04/2007		10/2008
System ready to accept online applications from the public	04/2007		11/2008
Release 2: Requirements Definition	TBD		
Release 2: Development	TBD		
Release 2: Operational	TBD		

c. Benefits

Management of academic appointments, which includes application and review processes and statistical reporting, has been cumbersome and time intensive. Paper processing, which can take three or more months to complete, often is ineffective, results in lost documents, and relies on standard mail systems that limit accessibility to select audiences. Advances in Web technologies have opened the prospect of streamlining operations, improving data for reporting purposes, and offering better service to internal and external customers. Specifically:

- Improved application processing accuracy and efficiency;
- Smaller staff needed to manage large programs;
- Standardization of data collected;
- Quicker, easier, and more accurate statistical reporting for senior management, Congress, and OMB;
- Increased potential for fund raising because of the state-of-the-art system and accurate statistics;
- Greater access to national and international audiences.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2008	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	• SCEMS/OF (primary system owners)	• SI-wide

4.4 The Web

Each unit continues to expand and enhance its presence on the Web whether it be electronic delivery of our collections, access to research data, interaction with Smithsonian expertise, and/or online exhibits. This section of the document summarizes the plans each unit envisions for its future Web presence centered around:

- Diffusing knowledge among the audiences that the Smithsonian serves;
- Integrating it seamlessly into all Institutional activity;
- Making it reliably accessible in a timely manner and useful format;
- Engaging Web visitors in ways that encourage a participatory online community.

To the general public, the Smithsonian is one institution. Yet the Smithsonian's present day websites do not reflect this view. While the Institution's Web content is rich and extensive, we currently do not have all of the necessary tools in place to provide searching of all of its web-accessible content from one place even though the Google Search Appliance helps in this endeavor. For instance to find everything that the Smithsonian has on butterflies whether it is viewed as an image of a piece of oriental pottery decorated with butterflies, in a painting at SAAM, the vast species information available through NMNH, or the location of the National Zoo's butterfly house the public often needs to understand how the Smithsonian is organized and how to navigate each of its websites. Progress is gradually being made. Such as in FY 2009 with the implementation of the first pan-Institutional calendar to find pan-Institutional information about related activities with one click including educational offerings or docent led tours.

During this planning period the Institution will implant a pan-Institutional Web strategy. The Smithsonian's Web strategic plan will initially focus around the following three main areas to strengthen the authoritative nature of our websites:

- **Reduce Brand Confusion.** More and more people use the Web to find information by going to common search engines such as Google to find answers and the information they are seeking. As a result in the common vernacular, Google has evolved from a website to a verb as people say to "just Google it!" when viewing search results how does the visitor know which is the official website and where to start? To add to the confusion, once they click a link to a site, a visitor generally needs to know the organizational structure of the Smithsonian in order to know how to navigate to the Smithsonian site that includes the desired information. It is analogous to the physical visitor who comes to the National Mall and begs the question where is the Smithsonian as they are surrounded and overwhelmed by our many museums? While improving our internal search tools will help, the Institution needs to find a way to coordinate the goals and relationships across its many sites to meet the visitor's expectation that the Smithsonian is really "one" institution.

- **Identify and Exceed Audience Expectations.** Over 16 different types of virtual visitors have been identified as having different needs for the Smithsonian websites. Visitors from educators and researchers to students, from hobbyist and enthusiasts to volunteers, from cultural and civic leaders to government professionals. Each audience type has different expectations and requirements. The goal of this topic area is to provide content and communication tools specific to these audience types, enabling Smithsonian to attract and retain these visitors in greater numbers. The scope of this topic will also include developing a strategy to engage audiences in new ways such as by leveraging search engines such as Google, and social networking sites like Flickr which the Smithsonian joined in a pan-Institutional manner in FY 2008.

- **Provide Shared Services.** Shared services are a set of common tools and standards upon which Smithsonian units can draw to facilitate their work individually and communally. With 19 museums and 9 research facilities, there is innovation and program development heading in many different directions simultaneously across the Institution. Coordinating and supporting the multitude of initiatives with a consistent information technology infrastructure and to avoid duplication of efforts is the primary challenge that shared services will strive to resolve. In 2008, the Smithsonian selected a pan-Institutional calendaring and event publishing system for implementation during FY 2009. The calendaring system's enhanced features allow Web visitors to filter, search and add events to their own calendars such as Outlook and Gmail. Web visitors can also subscribe to events, and receive reminders and notification of new events geared to their personal interest via RSS feeds, e-mail and text messages. This will be the first of many shared services to be implemented at the Institution to our ability to deliver on expanding virtual visitor demands.

During the planning period, the Smithsonian's Web strategy efforts will continue to look towards developing shared services that allow the Institution to leverage social networking and participatory technologies while remaining relevant to society. Our approach will be to:

1. Understand our Web audiences including end-user satisfaction surveys
2. Produce an evolving Web strategy
3. Embrace Web 2.0 and emerging Web 3.0
4. Develop shared tools and an Internal Center of Excellence
5. Support internal communication

In FY 2008, the Smithsonian websites collectively experienced a drop from 185M to 173M visitors in the number of Web visitors for the first time since the Smithsonian created its first public website. Overall visits decreased 5.6% and page views were down 9.23% even after what was a small bump with the launch of the National Museum of African American History and Culture's website earlier in FY 2008. However the Institution did see a tremendous increase in traffic related to collection orientated sites:

- SIRIS saw a modest increase in visits (10%) and page views (7.6%),
- National Postal Museum's Arago experienced 60% increase in visits with page views increase of 28%.
- Smithsonian Photography Initiative's website also experienced 60% increase in visits with page views increase of 304%.
- National Air & Space Museum's eMuseum collection site experienced the largest increase with over 339% increase in visits and over 1,694% increase in page views.

The Smithsonian has experienced organic growth for a decade with little or no coordination among our sites on the strength of our name and content. The social networking phenomenon has turned our consumers into producers. They now spend significant online time socializing and producing content. It's a new paradigm and we have to build new structures to remain relevant. For example, the democratization of social media in the Institution where curators, researchers, and other specialists communicate directly with the public and other vested audiences leveraging social media tools will demand a different mindset requiring a strong bottom-up element and engage a broad base of Smithsonian staff.

In response to this shift, we launched a Web strategy initiative in FY 2009 to allow us to understand and adapt to these dynamic changes in a rapidly evolving environment in order to build relationships that aren't centered around a single event, but instead through cumulative events and interactions that build loyalty with the Smithsonian.

The following sections provide examples of how many of our museums, research centers, and programs are moving out as pioneers by developing blogs, creating virtual museums in Second Life, experimenting with folksonomy, providing online community and social networking tools, and more! Internet technologies evolve quickly, and these early adopters will learn lessons that can be leveraged as shared services across the Institution within the planning period. Unit efforts and experimentation will inform the broader Smithsonian Web & New Media Strategy, and in turn be informed by the strategy itself.

4.4.1 Smithsonian Home Page (www.si.edu, aka www.Smithsonian.org)

Current Description

As the gateway to the Smithsonian, *si.edu* provides instant electronic access to the collections and programs of 19 museums and nine research centers worldwide..

Advancing "the increase and diffusion of knowledge" mission, this website provides important links to Smithsonian information, units, programs, and activities, such as various science and research programs, information for planning a Smithsonian visit, membership opportunities and information about current and upcoming exhibitions and events. The *si.edu* site strengthens the Institutional experience by providing those who would like to be a part of preserving one of the nation's largest education facilities a virtual connection without leaving the computer.

Plans for 2009 & 2010

To continue to provide up-to-date, user-friendly information through the Internet, by making improvements toward better user experiences based on user surveys and government and industry best practices; focus on providing site visitors the opportunity to have a well-rounded Smithsonian experience with a soft redesign of the entire Web portal as the number of virtual visitors is expected to increase; and support the efforts of the Pan-Institutional Web & New Media Strategy project.

The main goal is the major redesign of the entire *si.edu* Website. Future town hall meetings among key units and webmasters are anticipated to gather input for desired features of the new portal. The completion of these endeavors is dependent upon funding, support, cooperation and available resources.

Plans for 2011 & Beyond

The successful completion of the portal redesign and implementation for *si.edu* is the main focus of the Office of Communications (OPA & VIARC), OCIO, and Smithsonian Enterprises. The ongoing plans include strengthening the Smithsonian brand electronically among Institutional sites and supporting the continuing efforts of the Pan-Institutional Web Strategy initiative. During this time period, integrated social networking applications, wikis and/or other aspects of Web 2.0 are expected to be fully integrated in the new Web portal. The completion of this endeavor is dependent upon continuous funding and available resources.

4.4.2 Anacostia Community Museum (ACM), http://anacostia.si.edu/

Current Description

The Anacostia Community Museum (ACM) explores American history, society, and creative expression from an African American community and family perspective. The Museum encourages the collection, protection, and preservation of materials that reflect the history and traditions of families, organizations, individuals, and communities. The Anacostia Community Museum website exists as the presence of the Museum on the World Wide Web and furthers the mission of the Museum through the dissemination of information related to Museum exhibitions, programming, content, and related resource material.

The current incarnation of the Anacostia Community Museum website was launched in October of 2001 to coincide with the opening of the renovated Museum. The highlight of the overhauled website was, and continues to be, the Online Academy. The Online Academy is a virtual learning environment that features links to resources, information on artifacts in the Museum's collections, and streaming video presentations from leading scholars in fields related to the discovery, interpretation, and preservation of African American history and material culture.

In addition to the Online Academy, the ACM website features information on Museum programs, the Museum Academy Program and associated resources, current exhibitions, special events, previous exhibitions, and upcoming exhibitions.

Plans for 2009 & Beyond

As the technological and social environments evolve, the Museum seeks to engage new trends and utilize new technologies as appropriate in an environment of best-practices. Therefore from FY 2009 through 2014, the Museum will continue to utilize the Web as a means to disseminate compelling content to diverse audiences in as efficient and cost-effective a manner as possible, and to make the Museum's collections more accessible to the public.

4.4.3 Archives of American Art, www.aaa.si.edu

Current Description

The Archives of American Art (AAA) serves a diverse audience of scholars, curators, students, writers, teachers, art dealers, art patrons, artists and the general public. The website development has strategically focused on providing database driven access to collection information and digital surrogates of collections; incorporating archival and library professional standards for description and access; utilizing the Web to publicize AAA activities and events; and providing reference services and information to the public.

Since 2005, the focus of AAA's Web strategy has revolved around the $3.625 million grant from the Terra Foundation for American Art to support a six-year digitization effort that will result in approximately 1.2 million digital images made accessible on the website by the end of 2011. Key to the success of the grant is the funding it provides to AAA for robust internal and external website development, including two Web Developers (one full-time and one part-time) and one full-time Webmaster, all of whom work closely with AAA's permanent federally funded staff. Their duties include designing and programming public and internal websites and applications, structuring information architecture, evaluating and incorporating user feedback on Web content and interfaces, and supporting all manner of digitization, server and technology infrastructure issues.

A major component of the database and information architecture is based on AAA's adoption in 1999 of the EAD (Encoded Archival Description) Data Type Definition to describe its collections, as well as its development of a SQL Server Database to support digitization and a growing number of collection management activities.

Plans for 2009 & 2010

Website plans for FY 2009 and FY 2010 are focused on four core areas of access to collections and oral histories, usability, website redesign, and e-commerce.

1. Access to collections and oral histories:

- Scan collections to produce approximately 600,000 archival master TIFF files, generating JPG derivatives, and providing access via www.aaa.si.edu/collectionsonline and www.si.edu/searchimages
- Store and preserve these digital files with support from the Smithsonian's enterprise solutions managed by the Office of the Chief Information Officer.
- Evaluate Google Search Appliance indexing of collections on www.si.edu.
- Evaluate effectiveness of Flickr and identify and submit additional content.

- Reach out to our audiences in a proactive way, increasing the number of access points and interfaces into our research collections, and promoting opportunities for increased interaction through social tagging and other Web 2.0 technologies.
- Build on successful EAD based programming and implement TEI (Text Encoding Initiative) as a standard for managing, describing, and providing Web access to AAA's Oral History Program interviews; transcribe a backlog of untranscribed interviews; provide Web access to backlog of existing transcripts not encoded for Web access; digitize audio excerpts; and provide user-friendly access to digital audio files via the website.
- Introduce EAC (Encoded Archival Context), a developing XML standard for authority records.
- Actively participate in development and implementation of EDAN by providing content and staff expertise relating to CIS, content, digital asset management and preservation, and Web interface design issues.

2. Usability

- Setup usability testing and evaluation workstation; conduct usability tests; analyze test results.
- Plan and conduct a task-based usability study of our current website based on a planned homepage redesign.
- Support development of staff expertise through participation in professional organizations, conferences and communities related to Web usability.
- Find opportunities to collaborate and share information about AAA's usability activities within the Smithsonian.

3. Web Redesign

- Evaluate, select and implement design templates from a design contractor.
- Evaluate and integrate a blog and selected Web 2.0 technologies to enrich and personalize the Web user experience
- Evaluate and upgrade hardware/server and open source technologies

4. E-Commerce

- Add the ability for users to "save" a portfolio of images, and to order images online through a Web form.
- Online purchasing of event tickets, membership registration/renewal, and financial donations through Web forms and the CyberSource Hosted Order Page.

Plans for 2011 & Beyond

Plans for FY 2011 and beyond include continuing efforts from FY 2010; developing websites in collaboration with other Smithsonian arts, archives, and library units; actively seek fundraising to support continuation of work beyond the Terra Foundation for American Art grant (which ends in 2011). We will continue to incorporate digital preservation, metadata repository, and other technological and Institution-wide developments into AAA's CIS, website, and strategic planning.

4.4.4 Center for Folklife & Cultural Heritage (CFCH), http://www.folklife.si.edu/

Current Description

The Center for Folklife and Cultural Heritage (CFCH) uses three websites to promote understanding and continuity of diverse, contemporary grassroots cultures in the United States and around the world. The Internet is an extension of Smithsonian Folklife Festival stages, Smithsonian Folkways Recordings, and other cultural educational programs, where cultural practitioners speak for themselves, with each other, and to the public.

- http://www.folklife.si.edu/ serves primarily as a portal to CFCH collections, projects, and events: the Smithsonian Folklife Festival, The Ralph Rinzler Folklife Archives and Collections, Smithsonian Folkways Recordings, Smithsonian Global Sound, and the Center's cultural heritage policy program. It is used heavily by visitors to the Smithsonian Folklife Festival (SFF) as a means to plan their visit and enrich their Festival experience. The Folklife Archive section offers information on each collection and online finding aids for researchers and scholars. Newly digitized educational products and stand alone online exhibitions produced over the years are grouped for easy downloading and linking.

- Smithsonian Folkways Recordings (SFR), http://www.folkways.si.edu/, is a nonprofit documentary record label operated by CFCH functioning primarily as a storefront, allowing users to search, browse, and purchase over 3,000 recordings from the collections. Through the dissemination of audio recordings and educational materials the Center seeks to strengthen people's engagement with their own cultural heritage and to enhance their awareness and appreciation of the cultural heritage of others. Users can listen to 30-second samples of each track and enjoy a streaming radio. As with other record label websites, the SFR site offers information on special promotions, artist tour dates, licensing, and distribution. The website also extends the educational mission of SFR, hosting essays on artists and traditions, lyrics and translations, errata, online exhibits on projects such as *The Anthology of American Folk*

Music, *The Best of Broadside*, and the *Music of Indonesia* series, and rotating multi-media articles on new releases and special projects.

- Smithsonian Global Sound (SGS), http://www.smithsonianglobalsound.org/, harnesses the power of Internet commerce to deliver recorded sound from many cultures around the world to the widest audience possible as an international network of music audio archives (including SFR as well as others). The Webby nominated and award-winning website offers more than just digital music downloads. Through a powerful search engine and a wealth of contextual information including downloadable liner notes, streaming radios, videos, and articles on artists and traditions, users may discover and appreciate other people, other value systems, and other realms of human accomplishment. There is also a section specifically for teachers and students with lesson plans and activities to encourage the website's use in the classroom. Another version of SGS—one for libraries, is run as an institutional subscription site by CFCH contractor Alexander Street Press. Additionally, SGS has formed partnerships with several other Smithsonian museums, basically providing the "soundtrack" for their collections, through such websites as Radio Asia for the Freer and Sackler Gallery, Radio Latino for the Smithsonian Latino Center, and Radio Africa for the National Museum of African Art.

Plans for 2009 & Beyond

Over the planning period these three websites will increase the distribution of digital assets, and better integrate design and functionality between their websites. CFCH will enhance its Web team with an entry-level, in-house Web designer. As opportunities arise with the Smithsonian generally and with specific Smithsonian units, CFCH is poised to cooperate closely in providing greater access to content and an improved comprehensive experience of the Smithsonian's collections and activities.

4.4.5 Cooper-Hewitt National Design Museum (CHNDM), http://ndm.si.edu/

Current Description

Cooper-Hewitt, National Design Museum's (CHNDM) website promotes exhibitions, educational initiatives, membership, the e-commerce shop, and public programs for the museum.

In 2008, the exhibition Website for *Design for the Other 90%* won the Webby Award in the Art category. Cooper-Hewitt also set up a Google Analytics account to track visitation trends throughout all of its separate sites in order to get a big picture view of what our visitors are doing on the Web. Cooper-Hewitt continues to use a Google Grant to promote exhibitions and programs through Google's Adwords program. The website's focus continues to shift from exclusively museum-generated content to a greater emphasis on user-generated content as exemplified in the examples below:

- **Educator Resource Center**
  CHNDM's Educator Resource Center provides resources for educators interested in incorporating design into the classroom. The website features over 200 design-focused curriculum guides, Web resources, books, and articles as well as standards based K-12 lesson plans written by classroom teachers from around the country. A discussion board allows teachers to collaborate. Cooper-Hewitt's Educator Resource Center was a Webby Official Honoree in 2008.

- **Capital Campaign**
  CHNDM's launched the RE:DESIGN website to promote the Museum's Capital Campaign and Museum renovation project. The website provides an overview of the goals of the campaign, up-to-date information on the status of the renovation, and a form to allow visitors to donate online.

- **People's Design Award**
  The People's Design Award website was launched as a means for the public to nominate and vote as part of the National Design Awards program. The site features a nomination tool, commenting on nominees, and a voting system to calculate the results

- **People's Design Award Facebook Application**
  In 2008, Cooper-Hewitt created a link between the People's Design Award Website and Facebook through a custom Facebook Application. This application allowed PDA users to link their accounts, share their votes with Facebook friends, and promote their favorite nominated design directly on their Facebook profile.

- **Design Blog**
  A Design Blog featuring posts by Cooper-Hewitt staff, curators, and the design community. The blog is used to promote special programs, exhibitions, and current news from Cooper-Hewitt and the design community.

- **Video Archive**
  A video archive Website featuring past public programs, lectures, and workshops in their entirety as an educational resource for educators, students, and the general public.

- **Youtube Channel**
  A YouTube channel featuring exclusive content tied to special programs and exhibitions at the Museum.

- **Facebook page**
  In 2008, Cooper-Hewitt created a special Facebook page to expand its audience and to promote special programs and exhibitions at the Museum.

- **Collection Access**
  Cooper-Hewitt updated its eMuseum collection access site to integrate the look and feel with the main cooperhewitt.org site.

- **Events Calendar**
  In 2008, Cooper-Hewitt launched an improved Events Calendar giving our visitors more options to filter and sort events and special programs happening at the Museum.

- **National Design Week**
  Cooper-Hewitt's National Design Week website gave an overview of the events held at Cooper-Hewitt and across the country. The website allowed visitors to register online for events at the Museum and access our Design Across America interactive map to find design events in their area. Visitors are also encouraged to submit an event to the map through an online form. There were over 300 listings from all 50 states in 2008.

- **National Design Awards**
  Cooper-Hewitt launched the National Design Awards website announcing the jury, winners, and finalists of this year's awards.

Plans for 2009 & 2010

As an interactive extension of the Museum's public space, the website provides substantial educational tools for teachers and students, expanded exhibition-related research, and additional scholarly material. This is just the beginning. In 2009, pending funding and staff, the website will feature:

1. What is Design? … a video rich site
2. Increased digitization of the collection

3. An Encyclopedia of Design
4. An archive of all National Design Awards winners and finalists
5. Design games and related educational material
6. Improved website personalization and membership services

Plans for 2011 & Beyond

We want to reach all of our audiences, including art and design schools the design community, and young people. Cooper-Hewitt has ambitious plans for its website as it continues to shift from exclusively museum-generated content to a greater emphasis on user-generated content.

The Cooper-Hewitt website will essentially become the Online National Design Museum: a design hub which will cultivate and publish design related content (videos, articles, podcasts, blogs), offer an authoritative encyclopedia and timeline of design history, host unique online-only exhibitions, and feature a dramatically expanded offering of objects from the Museum's permanent (and virtual) collection. Users will be encouraged to produce, edit, write, curate, and critique in all areas of the site.

4.4.6 Freer & Sackler Gallery of Art, www.asia.si.edu

Current Description

Over the past several years the Freer and Sackler Galleries website has grown into a rich Asian art resource. The site currently includes a library of over 30 Flash interactive features based on the museum's exhibitions; around 9500 collection objects with associated tombstone data and curator comments; eGallery, an application that allows Web visitors to create their own online galleries using artwork from the collections; a database-driven events calendar listing all public programs; three series of podcasts; and extensive resources for educators.

In 2008 we began work on an in-house site redesign. We completed the planning phase including a new site architecture, finalized a design concept, and began development. We also launched our first online catalog, which focuses on the Hauge collection of Southeast Asian ceramics. At launch the site included almost 300 objects from the collection, and it will grow to include all 800+. The site is designed as a collaborative space for scholars in the ceramics field; experts are encouraged to contribute their own comments and notes on their own work. The site also includes interactive maps, essays, extensive bibliography and other resources. .

Plans for 2009 & 2010

The redesigned website is scheduled to launch in the summer of 2009. The main goals of the redesign are a new site architecture and new visual design, but we are also working with curatorial staff to build small collections-based features.

Phase two of the redesign, scheduled for 2010, will be a complete redevelopment of collections online.Having launched our online ceramics catalog in 2008, we have now begun planning and fundraising for future online catalogs or other major collections-based websites.

Plans for 2011 & Beyond

In 2011 and beyond we will continue our focus on expanding access to the Freer and Sackler collections, both through collections online and through Web features focusing on specific subsets of the collection. We plan to continue the collaborative model we developed in our ceramics catalog, which encourages peer exchange and is designed to take advantage of expertise outside of as well as within our museums. Future collections-based features will target a variety of audiences – scholars, enthusiasts, educators, students/youth, and the general public.

4.4.7 Hirshhorn Museum & Sculpture Garden (HMSG), http://hirshhorn.si.edu/

Current Description

The Smithsonian's Hirshhorn Museum and Sculpture Garden is a leading voice for contemporary art and culture providing a national platform for the art and artists of our time. Its website provides visitors with information and resources to deepen their understanding for modern and contemporary art. Redesigned in 2008, the Hirshhorn website offers information about the museum, exhibitions, programs and objects in the collection. Our collection search catalogues nearly all 13,000 objects in the Hirshhorn collection, many with images. We also offer a wealth of audio and video content through our Podcast series, available on our website and through Apple iTunes.

Plans for 2009 & 2010

The Hirshhorn website will continue to provide visitors with up-to-date museum information and extended data about objects in our collection. We will be working to integrate new features to the website, such as expanded online donations and a new ticketing system for After Hours events. We will also continue to experiment in social networking and new media with refocused efforts on Twitter, Facebook and Flickr

Plans for 2011 & Beyond

While only just redesigned in 2008, it is never too early to begin thinking about the next incarnation of the website. With a focus on new media at the Hirshhorn and at the Smithsonian as a whole, we hope to keep the site on the cutting edge of museum websites and will evaluate and evolve the website to utilize new technologies.

4.4.8 Horticulture Services Division (OFEO), gardens.si.edu

Current Description

The Horticulture Services Division's (HSD) website provides an overview of the Smithsonian gardens as well as tour schedules for the gardens, general information about HSD's collections, exhibits, operations and internship and fellowship programs. HSD staff creates, updates, and manages the site without the assistance of a full time webmaster or IT specialist on staff, but occasionally receives assistance from OCIO Web Services Division staff when exploring new Web functionalities. In FY 2008, HSD's website received on average more than 8,000 Web visits per month with more than 25,000 hits per day.

HSD Web pages are generated using standard templates which enables staff to maintain the general look and feel throughout the site and produce new pages without changing the basic navigation of the site. Banners within the templates are temporarily changed to provide information about such special programs as HSD's annual Orchid Exhibition and Garden Fest programs. The website is carefully laid out in discrete sections which enable staff to restructure portions of the website without disrupting other pages. Staff can update content and images, add new pages, and delete obsolete pages quickly without the services of a Web contractor.

HSD's website links to two external Smithsonian databases that are maintained outside of HSD. The 'Collections and Education' section of the website linking to Smithsonian Institution Research Information System (SIRIS), www.siris.si.edu, provides online access to catalog records and images from the Archives of American Gardens (AAG) and the Smithsonian's Garden Artifacts and Furnishings Collection. This section of the website also includes Web pages with content generated through the SIRIS database online utilizing dynamic Web pages and APIs developed and implemented with the assistance of OCIO's SIRIS Office. The intern section of HSD's website links to Smithsonian Online Academic Appointment System (SOLAA), www.solaa.si.edu, a database maintained by the Smithsonian Center for Education and Museum Studies. HSD joined SOLAA in the fall of 2009 and is currently using SOLAA for managing HSD's intern application process.

Plans for 2009 & 2010

Horticulture's existing navigation and Web design was carefully planned to provide flexibility for content modification and updates, and it continues to serve well in that regard. HSD will continue to collaborate with OCIO's Web Services Division on future projects in order to improve its webpages and maintain a manageable website. HSD plans to:

1) *Repackage collection information from SIRIS database*: Horticulture Collection staff will continue to explore implementing dynamically generated pages utilizing the API functions developed by SIRIS for disseminating HSD collection information through the SIRIS database

2) *Improve access to collections:* Collection staff has advertised a 2009 one-week intern project description in conjunction with the University of Michigan's School of Information's Alternative Spring Break internship program to assist with the update of the Archives of American Gardens' 'Guide to the Collections' Web page.

3) *Seek additional Web support:* The Office of Facilities Engineering and Operations' (OFEO) Technical Advisory Committee is reviewing the possibility of hiring the first IT position for the OFEO organization. If this position is funded and filled, it will furnish HSD with the staff expertise needed to explore new Web functionalities. HSD staff will remain active on OFEO's Website Task Force in order to advocate for this new IT position in 2009.

4) *Increase public visibility for Smithsonian gardens:* HSD will continue to work with Go Smithsonian to highlight the Smithsonian gardens as a visitor destination. Likewise, HSD would like to seek additional opportunities to represent Smithsonian gardens on the main Smithsonian website.

Plans for 2011 & Beyond
Develop virtual tours of each of the Smithsonian gardens which would change with the season and include planting lists. Continue progress as outlined above.

4.4.9 National Air & Space Museum (NASM), http://www.nasm.si.edu/

Current Description

The National Air and Space Museum maintains the largest collection of historic air and spacecraft in the world and is a vital center for research into the history, science, and technology of aviation and space flight, as well as planetary science and terrestrial geology and geophysics. The Museum receives more than 9 million visitors a year at its two facilities, the National Mall Building in Washington, DC and the Steven F. Udvar-Hazy Center in Chantilly, Virginia. The National Air and Space Museum website extends the mission of the Museum to a global audience, receiving over 10 million virtual visits a year. The website provides access to visitor information, collections, exhibitions, research activities, public programs and educational resources, and also seeks to engage audiences with content and features geared to an online audience.

Current features include:

- Searchable collections database
- Searchable image database with registration for high resolution imagery for press
- Online exhibitions and educational activities
- Information about ongoing scientific research and access to archival collections
- Webcast lectures, live and archived

- Online membership and parking pass sales, search tool to find names on Wall of Honor
- Calendar of events and programs
- Online reservations for group and school tours, lecture tickets, seminar registrations
- Visit planning with multilingual visitor guides/maps in 9 languages

Plans for 2009 & 2010

Despite significant resource challenges over the past year, progress has been made in key areas of online outreach and improved user-experience including but not limited to expansion and enhancement of online collections information, implementation of Google search and SEO activities, initiation of a podcasting effort (series in production, not yet live), regular webcasting of lecture programs, development of new online educational activities, experimentation with external social media presence, and several online exhibitions and web-connected museum interactives that are currently under development. Although resources have not allowed NASM to initiate a long-planned site-wide redesign yet, NASM is working to ensure redesign plans remain relevant to current Museum goals and industry trends.

In 2009, the Museum will continue to pursue necessary resources for a site-wide redesign. In the interim, and relevant to redesign goals, NASM will focus on the following key areas:

- Continue to expand/enhance online collections information & cross-collections searching
- Promote and expand Research content (both scientific and historical).
- Revise some current & launch new online exhibitions (*How Things Fly*, *Moving Beyond Earth*)
- Launch *How Things Fly* online educational activities and develop online "webisodes" for live science demonstrations
- Initiate a NASM Blog
- Create Udvar-Hazy Center interactive “Podmap” which will leverage video content previously created for handheld tours as podcasts for use on visitor portable devices
- Initiate podcast lecture series, increase online multimedia assets
- Enable online membership renewals and Wall of Honor purchasing
- Continue to support external social media presence to promote Museum and programs, track effectiveness
- Interactive “This Day in Aviation and Space History” timeline
- User-interface and usability enhancements on current site (until redesign is possible)
- Engagement of volunteers and interns to support design projects, social media and other online outreach efforts

- Participate in central Smithsonian Web Strategy development and complete a coordinated unit Web strategy (in progress)

Other strategic opportunities may arise. Opportunistic funding will continue to be sought for integration of new features and enhancing the user experience, integration of social media, podcasting and other avenues of interactivity and engagement.

Plans for 2011 & Beyond

Smithsonian is currently working on a central strategy for Web outreach that will guide NASM Web strategy for 2011 & beyond. Cross-collections searching and custom curator online exhibitions are key areas of focus for NASM. Social media trends are difficult to predict, but the user-experience will likely require increased user-created content and user-controlled experiences. Technology and audience needs will continue to evolve over the next few years, opening up unforeseen opportunities for Web outreach and tighter integration between the in-museum and online experience. NASM anticipates mobile technology and integration of museum interactives with Web features will be major focus areas. NASM is already experimenting with cell phone tours and new interactive concepts. A new exhibition is planned for 2012 that focuses on navigational technology. The exhibit will include a Google Maps/Google Earth implementation for both in-museum interactives and Web, but it is too early to predict what form that will take.

4.4.10 National Postal Museum (NPM), www.postalmuseum.si.edu

Current Description

The National Postal Museum was created in 1990 by an agreement between the Smithsonian Institution and the United States Postal Service. It was opened to the public in 1993 in the historic Post Office building adjacent to the U.S. Capitol and Union Station in Washington, D.C.

The museum collections contain over 6 million items of postal memorabilia, including original stamp designs, stamps, postal artifacts, and an assemblage of historical items related to postal operations. The museum features exhibits of public and private collections as well as permanent displays. Many of the exhibits are interactive, and all are both user friendly and educational. The museum also sponsors lectures and hosts special events.

The NPM website currently features information about visiting the museum, its collections and exhibits; research-related resources; and opportunities for involvement with the museum. More than twenty online exhibits are featured along with curriculum guides, tours, and lesson plans for teachers and students. Museum events are highlighted, including past, present, and future symposiums, lectures, and public programs. Online articles, finding guides, and photographic

archives provide multiple paths to exploring the museum's vast collections and resources.

Arago, www.arago.si.edu, is the National Postal Museum's collections website or "virtual vault," featuring images and narratives reflecting philatelic and postal history treasures. This unique Internet application is committed to providing public access to digital images and fully researched text associated with the National Postal Museum's (NPM) vast collection and includes world class private collections displayed at the museum. More than 100 expert volunteer researchers contribute by conducting original research and submitting narrative descriptions of philatelic and postal operations objects.

The Arago website currently features more than 13,000 philatelic and postal operations objects from the museum's collections, including high-resolution images and supporting narrative text. The site also features a series of online exhibits which highlight themed objects in an interactive environment. Viewers of online exhibits can learn from the overarching storylines presented, click on individual objects to learn more, "zoom in" to see incredible detail, and explore related objects. A "My Collection" features allows visitors to create multiple collections of their favorite objects and offers the ability to share individual collections with others.

Plans for 2009 & 2010

Over the next two years, the museum's main website will be enhanced through the creation of new modules designed to attract new audiences and promote walk-in visitation. A new memory book will be launched to capture and share oral histories from the more than one million current and former men and women of the Postal Service and Post Office Department. Behind-the-scenes tours (textual, audio, and video) and a spotlight on people will provide glimpses into the operations of the museum and its employees in order to create dialog between and amongst visitors, professionals, and scholars. Additionally, a focus will be placed on adding new educational material for students and teachers as well as significantly increasing the publication of scholarly research.

The main goal for the Arago website includes establishing a community of users to guest curate online exhibits and engage in discussions about museum objects and offerings. A special focus will be placed on diversifying our audiences to include key ethnic and cultural segments through new online exhibits and collaboration. We will focus on publishing rare and valuable international philatelic collections never before available to the public and significantly increase the breadth and depth of our online exhibits in order to better serve new and niche audiences.

Plans for 2011 & Beyond

A major redesign of the museum's main website is planned for 2011, pending successful fundraising efforts. The redesign will better integrate the Arago website, strengthen brand identity, and incorporate the latest available

technologies for engaging global audiences. New opportunities to serve and engage teachers and students will be amongst the top priorities of the site's redesign as will opportunities to promote user-generated content and dialog from all audience bases. State-of-the-art promotion of the museum and fundraising capabilities will also be priorities.

The entire site redesign will account for the vast differences in current and future audiences. Providing unique views and interaction with our assets based on visitor preferences will be a primary guidepost for the new site.

4.4.11 National Museum of the African American History & Culture, http://nmaahc.si.edu/

Current Description

NMAAHC's "Museum on the Web" was launched in FY 2007 as the first phase of an interactive and connective Web presence designed to foster a sense of community, engage visitors, and extend visibility in advance of its physical presence. The website was created as part of an in-kind corporate grant as a vehicle that drives the Museum towards fulfilling its mission and vision to: 1) create an opportunity for those who care about or are interested in African American History and Culture to explore and revel in this history; 2) use African American History and Culture as a lens into what it means to be an American; 3) tell the African American Story in an international context; 4) be a place of collaboration – supporting and encouraging the work of local museums and education institutions, as well as serve as a tool to help the museum accomplish critical goals that will move us forward in the construction of the building.

When it was first created, the NMAAHC site dabbled with the effort to encourage community-generated content and social tagging. This is best expressed in the site's Memory Book, where the audience can register and upload personal memories (text, audio, photographs) related to the African American experience. After more than a year of operation, the Memory Book has not "taken off" and at the same time there is a growing consensus that the Museum's efforts to be a collaborative social site may not work solely in an si.edu domain. Additionally, the site was designed in a way that does not allow for the Smithsonian's content management system to be utilized, now that in-kind corporate support will not be available during the planning period which significantly limits NMAAHC's ability to maintain and enhance the site..

Plans for 2009& 2010

NMAAHC has hired a Web content manager to find ways to improve the content and user experience. A major effort will be to determine the best means of moving the day-to-day management of the site from the vendor to NMAAHC; and to build in a content management system. This will likely require a major redesign

of the NMAAHC website and this is the top priority for the museum in 2009 and 2010.

Even as this redesign occurs, the museum will continue to utilize the Web presence in an effort to engage the public in the building design process, develop constituency, increase visibility, extend programming, and secure funding. Aside from continuing to maintain updates on its existing site through the vendor, NMAAHC has launched a Facebook page and will examine participation in other areas of the Web (such as Flickr, Youtube, etc.) as its available content and needs of its audience require. Growth of its Web/New Media team is expected in late 2009 or 2010.

Plans for 2011 & Beyond

Plans for FY 2011 and beyond include use of its new, in-house website to inform the public about the museum's programs, activities, and growing collection efforts. More importantly, as the architectural design process for the new museum, groundbreaking, and construction begin, the NMAAHC website will serve as a site for the public, donors, Congress and other stakeholders to view updates and keep informed about the building process, as well as conduct virtual tours of exhibitions, and allow interactive public conversation in some form regarding the museum's growth..

4.4.12 National Museum of American History (NMAH), http://americanhistory.si.edu/

Current Description

The National Museum of American History website is an electronic gateway to the museum and, on a larger level, an online repository for American national memory and a critical component in the museum's mission to preserve and spread knowledge of American history. The museum's focus is on engaging everyone in history, from young to old, individuals as well as families and groups, at the museum or as part of our outreach across the nation. As such, the website is built to meet the needs of our diverse audience by actively promoting events, exhibitions, and programs and showcasing our extraordinary collections and online resources. Features include:

- A searchable collections database.
- Calendars of events and exhibitions.
- A feature for educators, *History Explorer* that keys NMAH resources to teaching standards and makes them easy for teachers to find and use.
- A Flash-based timeline of stories from our exhibits, collections, and programs. Utilizing an interactive Flash interface, this feature places hundreds of objects in historical context and allows users to explore the museum's extensive Web resources through a serendipitous and engaging experience.
- A blog, "O Say Can You See?"

- Over 50 online exhibition websites and collection databases that range from simple HTML sites to media-heavy Flash sites.
- Links to NMAH presence on social networking sites such as Facebook and Flickr.

Plans for 2009 & 2010

In recent years, the ability of a nationwide, and even worldwide, audience to interact with the Museum has greatly expanded through the use of the website, electronic field trips, and other digital means. NMAH has responded in a number of ways, including a new blog, a customizable e-mail newsletter, and ongoing efforts to serve teachers in the classroom. However, we believe we are only beginning to tap the potential to reach new audiences, and better serve them, through electronic communication. We plan to expand initiatives that we already know are successful, including the continued growth of our online collections database, new features for the education audience, and use of third-party Web services. Specific plans during the planning period include:

- Support and facilitate growth of the online collections database.
- Add additional features to History Explorer such as an interactive online lesson builder and enhanced collection search.
- Grow and evolve the museum's blog to give users a more conversational relationship with the museum.
- Enhance our video capabilities and post more online video.
- Continue and expand our use of podcasting.
- Continue to experiment in the social-networking space and add features that encourage user participation.
- Continue to give exhibitions, events, and other museum programs an online presence.

Plans for 2011 & Beyond

As technology continues to remove barriers between the physical and the virtual, NMAH plans to make digital resources more ubiquitous both within the museum and for the public at large. Through our educational initiatives we plan to reach millions of students through innovative digital resources designed by and for teachers, as well as resources targeted at afterschool audiences and other informal settings. Online offerings will be augmented by adding objects, historical photos, oral histories and music to the searchable databases. Efforts will be made to reach users "where they are," whether it's on mobile devices, social networking sites, home, school, or even inside the museum. Specific plans include:

- Incorporate user-testing locations and protocols into the museum's new education space
- Expand use of features that promote dialog, feedback, and user-generated content
- Increase resources for the education audience
- Expand and diversify the collection database

- Increase revenue from online donations and other sources
- Develop content and features for mobile technologies

4.4.13 National Museum of Natural History (NMNH), http://www.mnh.si.edu/

Current Description

The National Museum of Natural History Web sphere extends the mission of the museum to inspire curiosity, discovery, and learning about nature and culture through outstanding research, collections, exhibitions, and education. Additionally, the NMNH Web presence supports the museum vision to understand the natural world and our place in it.

Our wide range of content reaches an audience that is wide and diverse including visitors, learners and educators of all ages and levels as well as targeted scientific and professional users, associates, and collaborators.

Consisting of over 135-plus stand-alone content presentations and data offerings, the NMNH Web presence spans the full spectrum of our science, collections, exhibits, and educational outreach. In FY 2008, our websites welcomed over 35.8 million visitor sessions and 25.5 million unique visitor sessions. These numbers represent an increase from over 40% from the FY 2007 statistics. Among the reasons for this increase was a wider reach of content and sites to new social and multimedia efforts such as Flickr, iTunes, YouTube, and Facebook. All of our content from those sites has links back to the NMNH pages. The Global Volcanism Program (GVP) to map volcano data on Google Earth continues to generate new visitors to that site and helped increase our statistics overall. It's also notable that we are still using the same unfiltered log analysis tools (WebTrends) as centrally supported by OCIO / WSD.

Throughout FY 2008, we continued our efforts with great success to spread the benefits of our new design and format to all top-level museum Web presentations as well as all seven of our scientific departments, with the outlaying museum offices and programs on schedule to launch their new and updated sites in FY 2009. Of the several new websites that make use of the template system, most notably is the Sant Ocean Hall website, which was completed during the opening of the Sant Ocean Hall.

More specific to our Research and Collections Information System (RCIS), current specimen data from various discipline specific collecting units are now available to the public via a standard RCIS Web interface. These data include records for more than 62% of NMNH's extant biological "type specimen" collections. (In taxonomy, the primary "type specimen," or sometimes a series of specimens, serves as the scientific name-bearing representative for any animal or plant species.) Over 3.98 million specimen records are currently available from this online facility, and we are constantly adding new data.

Most of the NMNH Web content is now being deployed and served through the centrally supported Web Content Management (WCM) system managed by OCIO. On site at NMNH, however, we still internally support research specific application and Web database facilities such as PHP, online GIS tools such as ArcIMS, and various online data management systems. Additionally, the Laboratory for Analytical Biology (LAB) at our museum support center supports a cluster of Web servers for genetic analysis collaboration and the serving of DNA sequence data.

Also within FY 2008, we completed a project to migrate our public Microsoft (MS) Access data-driven Web content to within the approved Smithsonian web content management system and database facilities. This effort involved the contractor-supported data migration of over 40 research-specific MS Access databases to MS SQL server. This project also involved building an administrative application to allow internal and external collaborators to efficiently update public research and Web data through approved Smithsonian Web systems.

Additionally in FY 2008, we completed the move of non-RCIS public data Web facilities and server systems, such as remaining public FileMaker databases, to OCIO hosted server clusters in the Smithsonian Data Center in Herndon. Research datasets that will not fit into the RCIS EMu system will also adhere to and be served from the Smithsonian's Data Center, and be served from the Smithsonian's secure DMZ.

Plans for 2009 & 2010

Plans for the NMNH Web presence in FY 2009 and FY2010 include extended template and update facilities for a new and improved virtual tour system and an improved "plan your visit section" and a new dynamic calendar system using the SI Wide "Trumba" calendar system as hosted by OCIO. These new features will better help users to learn more about our exhibit objects, plan their visits, and learn about upcoming events. Another goal of the virtual tour site and plan your visit pages is to provide pre-determined tour routes for the most popular objects given different ranges of visit durations.

For select offerings in the virtual tour as well as general content we will expand our Web presentations to include more interviews and lectures via audio podcasts and video casts, add image zoom features, and new Flash-based multimedia offerings.

We are also planning further improvement to our NMNH-specific search engine indexes by leveraging additional human resources to better manage and leverage the centrally supported Google appliance to create project- and department-specific content catalogues for improved content searching. And to the extent possible depending on Google licensing limitations, we will explore the possibility of indexing select RCIS datasets as a prototype to demonstrate truly integrated NMNH Web content.

We will continue our efforts to produce at least four new research, science, and collections Web content highlights as well as expand our Web offerings in support of new exhibits such as the *Butterflies and Plants: Partners in Evolution* exhibit and a collaborative Web portal for the *Human Origins: What does it mean to be human?* exhibit, which will be modeled or in some way parallel to the Web architecture and systems that are planned for the *Ocean Portal*.

Working more closely with integrated exhibition and education content, we will also continue to better add and manage content on our social media and multimedia websites such as Flickr, YouTube, Facebook, iTunes, iTunes U, and twitter.

Ocean Portal Prototype and **Ocean Portal**
In the Fall/Summer of 2009 marking the year anniversary of the Sant Ocean Hall, NMNH will be launching the Ocean Portal (OP). The vision of the OP is simple, yet sweeping – to enhance and promote ocean literacy by focusing on the ocean as a global system which is essential to all life. The OP will invite visitors to investigate the forces that generate, shape, sustain, and threaten ocean diversity. It will educate, engage, and inspire visitors to discuss current ocean issues and to act in informed ways.

Using immersive online exhibits built with the best interactive Web technologies, the OP will bring users to the ocean – and the ocean to users. It will also transport users to the coastline, the open waters, and the deep ocean, providing participants with experiences and perspectives typically out of sight and out of reach.

The OP will also make scientific research and information accessible to a broad general public, (particularly schoolchildren, teachers, and young adults) and help with building an informed and concerned community – the future stewards who will guard the health of the ocean and our planet.

NMNH is in a perfect position to usher in a new era for museum outreach in the digital age, with the OP positioned as a cutting-edge online destination designed to draw a wide audience and inspire a new generation to understand, love, and advocate for the preservation of the ocean and all ocean life.

The objectives of the Ocean Portal include:

- Highlighting the beauty, awe, dynamism, diversity, and fragility of the ocean and the life within it through dynamic, compelling interfaces.
- Making explicit and concrete the relevance and connection of the ocean to every person on Earth.
- Showcasing the best and most audience-appropriate information and resources that the Smithsonian and its partners have to offer.
- Using the most effective learning and community-building Web technologies.

- Providing an opportunity for users to share their passion and understanding of the ocean, their ocean experiences and perspectives, and their newfound ocean knowledge and assets with their friends, families, and networks.
- Encouraging encounters with marine life in every ocean habitat.
- Providing opportunities to go behind the scenes of research and oceanographic institutions in the United States to see science and conservation in action.
- Including links to scientists actively working to deepen our understanding of the ocean, a realm largely unexplored.
- Utilizing connections to collections, the latest data, and best resources of the Smithsonian and a large community of approved OP partners, which include many of the worlds' leading organizations and institutions committed to ocean research, education, and conservation.
- Increasing the presence of "tweens" using the OP, including extending the duration of their visit.
- Becoming known as the go-to website for US-based students researching the ocean.
- Inspiring the public to make one change to their daily lives that would positively impact the ocean.

OP Technology: Architecturally, to better support external collaboration and content population outside the SI network system, the OP will be based on the *Drupal* content management system and built on the LAMP (LINUX, Apache, MySQL, PHP) platform. In response to an increased number of requests from our supported units, curators, and scientists and science teams, the NMNH IT office is planning to implement a production pilot in support of hosting science specific data and content presentations using the LAMP system for the Ocean Portal and the *What Does it Mean to Be Human*, Human Origins website. We feel that with combined NMNH IT and OCIO technical support, we will be in a better position to implement , test, and host online projects leveraging the LAMP architecture.

Public RCIS (Research Collections Information System)
NMNH research collections are available to the public via a standard Web interface for the following ten museum collection units: Department of Anthropology, Department of Botany, Department of Entomology, Department of Invertebrate Zoology, Department of Mineral Sciences, Department of Paleobiology, and Department of Vertebrate Zoology; Divisions of Fishes, Amphibians and Reptiles, Birds, and Mammals. With an ever increasing need to make our appropriate national collections data publicly available, our next steps include making all remaining and appropriate EMu valid type specimen records available via the public RCIS Web facility through addition of specimen data for Paleobiology, Mineral Sciences, and Entomology. We will add RCIS data export options and will continue to collaborate with external distributed data facilities such as GBIF, FishNet, HerpNet, MaNIS, and ORNIS to better integrate our RCIS data. Additionally, plans are on track to move our public RCIS Web into museum-wide format and navigation to further improve online design identity.

INOTAXA

The NMNH IT Office is also part of the technical working group for an integrated taxonomic access system, known as INOTAXA. INOTAXA ('INtegrated Open TAXonomic Access') is a Web workspace in which taxonomic descriptions, identification keys, catalogues, names, specimen data, images and other resources can be accessed simultaneously according to user-defined needs. It will allow access to data held in multiple servers, and will use a distributed data model. If in the future, the various nomenclatural Codes permit Web publication of new taxonomic names and acts, INOTAXA will be able to integrate single descriptions placed on servers worldwide, so long as they are indexed through a registry such as operated by GBIF.

INOTAXA is built on an XML schema, taXMLit, that is interoperable with similar data from other sources (e.g., taxonomic names, concepts and specimens). INOTAXA is working with TDWG to ensure that standard schemas are used. These will allow external interoperability with GBIF and access to GBIF-mediated data. INOTAXA is also working with ZooBank, and has the potential to serve data in the format required to submit data directly. INOTAXA will provide seamless access from the content to other systems, including GBIF, TROPICOS and Flora Mesoamericana.

NMNH Intranet

In FY 2008, an Intranet taskforce was established and kicked off as an effort to improve the NMNH intranet and make it a more useful tool to share distribute and contribute information and content to and from the NMNH staff and other tenants in the Natural History building. While we understand that the Internet is for public facing content, we are hoping at some point to expand the NMNH Intranet to support at least some capacity (extranet) for external collaboration and content sharing from users such as exhibits design contractors, Web developers, interns, and other content contributors outside the SI network.

- The first phase of the project will be to implement a new and improved information architecture and design based on feedback that we solicited from the entire museum and building community.
- The second, more systems related, phase will be to determine the best platform for the new system. As of Jan 2009, the probable targeted platform will be to use Microsoft Office Sharepoint Server (MOSS) system. OCIO recently completed a MOSS pilot through which NMNH was able to test basic feature stets and it is likely given the central MOSS support from OCIO that we will target our platform to use that system.

Plans for 2011 & Beyond

For FY 2011 and beyond, the NMNH Web presence will continue to support the long-term strategic goals of the museum; work toward the goals of the overall Smithsonian Web strategy; especially target broader accessibility to our collections, exhibits content, increase public understanding of collections-based research and learning to inspire an appreciation for the importance of such work in our lives; and overall increase public and professional awareness of NMNH science.

More specifically, we will aim to support increased use and improved usability of our research and collections information and scientific content by building advanced tools that will incorporate more video and multimedia offerings and facilities such as increased Web 2.0 social networking offerings to extend the educational value both for outreach and discipline specific research and scholarship. We will also leverage advanced and industry standard interoperability facilities, both internally and externally, to integrate our collections and research data into other consolidated information facilities.

4.4.14 National Museum of the American Indian (NMAI), www.americanindian.si.edu

Current Description

The National Museum of the American Indian (NMAI) is committed to advancing knowledge and understanding of the Native cultures of the Western Hemisphere, past, present, and future, through partnerships with Native people and others. The museum works to support the continuance of culture, traditional values, and transitions in contemporary Native life.

As a significant component of the fulfillment of the NMAI's mandate to maintain communication with Native communities and work in collaboration with Native peoples in all aspects of its operations, the NMAI website represents a vital component of the museum's outreach program to its Native and non-Native constituents.

The website offers dynamic information on museum programs and services, exhibitions and collections, linking the NMAI and Native communities. It provides access to the museum's cultural and educational resources for audiences who may never have an opportunity to visit the museum's facilities. The website currently features an archive of more than 30 exhibition websites; a wide selection of downloadable radio programs; educational resources including a library of teacher and family museum guides and exhibition teaching posters and booklets; a bookshop including interactive views of museum publications and audio clips of recordings; multiple podcast series; visitor, collections, and community services information; and membership resources.

The NMAI website represents in a tangible way the museum's mandate to bring its programs, services, and information to Native communities in an accessible form that reaches far beyond the museum's walls. The NMAI will continue the expansion and development of the museum's website to increase public access to the museum's collections and information resources; to provide distance learning opportunities through a reciprocal and dynamic flow of information between the NMAI's sites and its Native and non-Native constituencies.

Plans for 2009 & 2010

The NMAI website is the visible cornerstone of what is called NMAI's "Fourth Museum"—envisioned as a virtual knowledge base that enables Native people to interpret, re-interpret, present, preserve, and protect their cultural heritage; enhance appreciation for the cultures of the original peoples of the Americas; and facilitate their interaction with larger worldwide audiences.

In the next two years, the NMAI website will feature upcoming and ongoing programs including Mother Earth/Indian Summer Showcase, Native Sounds Downtown, Classical Native, the Vine Deloria, Jr. Native Writers Series, the Native American Film and Video Festival, and exhibition sites including *A Song for the Horse Nation*, *Infinity of Nations*, and *Treaties*.

In February 2009, NMAI launched a dynamic, database-driven website presenting information about the museum's collections to a worldwide public audience. Featuring ethnographic and archaeological objects, modern and contemporary art, and historic and more recent photographs, the collections website presents vetted and approved data and images for each collection item via a searchable, user-friendly interface. The site also provides users opportunities to save or share information presented and to contact NMAI staff to request additional information or images.

With sustained support to assist staff in continuing to improve collections information for presentation online, the NMAI's collections website will eventually provide a comprehensive presentation of some 750,000 objects and 65,000 photographs in the museum's collection. Contributing to the full realization of the Fourth Museum concept, the collections website will also ultimately provide Native and non-Native users the opportunity to submit to the NMAI additional information about collections items, which may later be added to the museum's collections database and, in turn, reflected to a global audience via the collections website.

The NMAI is also developing more efficient and effective procedures for creating and maintaining web-based content across the museum, and these processes will be further enhanced by a comprehensive website redesign to be completed in early 2010. Through the collections database and underlying system supporting the collections website, it may also be possible to provide enhanced collections information directly to the NMAI's galleries via exhibition interactives and personal hand-held devices that can provide the museum's physical visitors with real-time, on-demand access to collections information.

These technologies may also increase accessibility to collections information in support of the NMAI's educational, publishing, and programming initiatives, as well as making the museum's collections information more widely available through linkage to and integration with similar resources held by libraries, archives, museums, and similar cultural organizations.

Plans for 2011 & Beyond

The NMAI will continue to investigate how emerging technology can support connections between the past and the present. The NMAI will be challenged to provide and expand meaningful access to its collections in their broader social context, and will seek to enable Native communities to provide context and tell stories about objects in a variety of ways that encourage the museum's online visitors to appreciate contemporary Native cultural life.

The website will draw upon and bring together tangible and intangible heritage resources held by Native peoples and museums around the world so that new collections encompassing multimedia, still images, documents, publications, and objects are aggregated from different institutions and discussed and interpreted online. The NMAI will continue developing a website that will make visible the multi-faceted relationships between NMAI collections and Native American communities and to present these to increasingly interconnected worldwide audiences.

4.4.15 National Portrait Gallery, www.npg.si.edu

Current Description

The Smithsonian's National Portrait Gallery was established by an Act of Congress in 1962 and opened to the public in 1968. The Portrait Gallery's mission is to collect and display images of "men and women who have made significant contributions to the history, development and culture of the people of the United States." It is the only museum of its kind in the United States to combine the aspects of American history, biography and art.

The Museum's various websites, and related Web presences, are responsible for supporting the museum's full range of exhibitions and programs, providing visitor information, and original content uniquely designed for the electronic medium. Historically, content initiatives have fallen into these main categories: 1) award-winning online counterparts to new NPG exhibitions; 2) robust search options for researching the NPG's collection and database of portraits from collections around the country; 3) information for target audiences such as tourists, event attendees, educators, students and researchers; 4) interactive forums such as the newly released blog, Facebook, and Flickr. We look for new ways to attract and serve both online and physical visitors, complementing and integrating with other functions of the museum.

Several new multi-media projects have been launched, as part of the Gallery's Web 2.0 initiative. The intent is to develop new, interactive, online communities with audiences that may have been previously unaware of the Gallery and its programs. In January of 2008, the NPG **Flickr** site was launched with a core of photos from NPG staff. Currently there are approximately 640 photos on the group site with 135 members. In the coming weeks we plan to join SI's Flickr Commons group by submitting images of portraits featured in the upcoming Portrait Competition. These will also be included in a special NPG Portrait Competition group.

In February the Portrait Gallery's ***Face to Face*** weblog (blog) was launched as a means of interacting with the museum audience. After 11 months of existence, and with postings averaging 2 per week, there have been about 90 posts to date. Lifetime pageviews are currently at 28,500 and recent viewership averages 150-250 visits per day. The numbers have been steadily increasing.

Also in February, a **Facebook** page was created for the Gallery. The page serves as a condensed version of the NPG website and includes information on events, lectures, exhibitions, links to and posts from the *Face to Face* blog, an RSS feed, a selection of Flickr images plus a listing of all the page's "fans." Currently, the fans number over 1,600 individuals, with that number growing at the rate of 6-8 new fans per day. It is worth noting that nearly half of the Facebook fans come to us from outside the US.

In a related electronic program, the NPG Web department has also implemented the **Guide By Cell** program. The program is currently used in conjunction with the *Mask of Lincoln* exhibition. Public response to the program has been enthusiastic, with about 1000 users of the phone tour per month.

The Museum's website averages 385,000 visitors, and 4,345,000 hits per month, during the school year. This number continues to expand from year to year as we attract new visitors with our list of new programs and exhibition resources. NPG's portrait and collections searches average 16,000 visits a month and visitors are encouraged to email npgresearch@si.edu for in-depth research requests.

In 2008 the National Portrait Gallery produced the following online exhibitions and features to enhance the museums presence on the web.

- ***Portraiture Now: Feature Photography,(***http://www.npg.si.edu/exhibit/feature/)

- ***One Life: The Mask of Lincoln*** (http://www.npg.si.edu/exhibit/lincoln/)

- ***Tokens of Affection and Regard: Photographic Jewelry and Its Makers*** (http://www.npg.si.edu/exhibit/jewels/index.htm)

- ***Women of Our Time: Twentieth Century Photographs*** (http://www.npg.si.edu/cexh/woot/index.HTM)

- ***Four Indian Kings*** (http://npg.si.edu/exhibit/kings/slideshow/kings.htm)

- ***Ballyhoo! Posters as Portraiture*** (http://www.npg.si.edu/exhibit/ballyhoo/*)*

- ***Herblock's Presidents: "Puncturing Pomposity"*** (http://www.npg.si.edu/exhibit/herblock/index.htm)

- **RECOGNIZE:** ***Hip Hop and Contemporary Portraiture*** (http://www.npg.si.edu/exhibit/recognize/)

- ***Edward Steichen: Portraits*** (http://www.npg.si.edu/exhibit/steichen/index.htm)

- ***Zaida Ben-Yusuf: New York Portrait Photographer*** (http://www.npg.si.edu/exhibit/zaida/index.html)

- NPG's ***Portrait Search*** and ***Collections Search*** were upgraded to eMuseum 3.6 and a search check box for objects on view in the galleries with up-to-date object locations was added.

- NPG added more than 88,600 portrait records from NPG Collections and the Catalog of American Portraits to the ***Smithsonian Cross Catalog Searching Center*** website with links to NPG's ***Portrait Search*** and ***Collections Search***.

Plans for 2009—2010

Plans for 2009 and 2010 will reflect National Portrait Gallery's commitment to expand the public's access to its exhibitions, collections, and programs. Consistent with the goals of Web 2.0 the museum will work toward increased interactivity and communication with the public. Our actionable plans include the following:

- **Virtual exhibitions. These** complement and enhance the museum's scheduled exhibitions, the following Web features will be created in 2009-2010: *Presidents in Waiting; Reflections/Refractions: Self-Portraiture in the 20th Century; Hide/Seek: Sexuality and Desire in American Portraiture; Outwin Boochever Portrait Competition; The Frontier Remade: Photographic Portraits from the American West, 1845-1924.*

- **Redesign of the NPG main site** *(Anticipated February 2009 release date).* This will create a cleaner, more contemporary appearance with more content available on top-level pages and on the homepage.

- **Audio/Video.** Create a diverse audio/video portfolio for iTunes University (iTunes U)

- **Guide By Cell**. Expand the use of the Guide By Cell audio tour program to include permanent installation galleries.

- **Google.** Refine and improve the NPG-specific search engine by using the SI-supplied Google appliance. To the extent possible create sitter/artist catalogs.

- **Calendar.** Incorporate the Smithsonian-wide calendaring tool.

- **Membership**. Enable online giving and membership opportunities.

- **Upgrade to eMuseum 4.0***(contingent on funding)***,** Redesign search menus, add more browse features.

- **Improve statistical reports** for eMuseum's *MyCollection* and improve *MyCollection* functionality.

- **User-provided tags.** Investigate the possibility of adding user tagged keywords to NPG's keyword search in eMuseum and including keywords in eMuseum's full-text search..

Plans for 2011 and Beyond

It is the aim of the National Portrait Gallery team to continue to produce a content-rich website. The museum also acknowledges the directional shift from exclusively museum-generated content to a greater interactivity with the public. We will continue to expand our reach and explore new ways for visitors to engage with NPG's collections in this increasingly interconnected world.

4.4.16 National Science Resources Center (NSRC), www.nsrconline.org

Current Description

The National Science Resources Center (NSRC) home site describes the origins of the organization and its mission, its parent organizations, NSRC's Leadership and Assistance for Science Education Reform (LASER) events, and its work. The site also includes pages containing a variety of resources for teachers, students, and parents. NSCR has three other major Web presences beyond its home site, which include:

- www.PropertiesOfMatter.si.edu, the NSRC received a Smithsonian Institution transformation grant to build this electronic literacy supplement for its middle school *Properties of Matter* (POM) physical science curriculum unit. The site contains reading selections from the POM unit supplemented with photos, illustrations, links to Smithsonian and other online resources; quizzes; and synchronized text, audio and Spanish text of each reading selection using Folkways Synchrotext software.

- www.stcms.si.edu, a student and teachers resources site containing links to supplement the NSRC's STC/MS middle school curriculum.

- www.ScienceTeachersAcademies.si.edu, supports the Smithsonian Science Education Academies for Teachers (SSEAT). This site contains event information including event sponsors, how to register, cost, location, lodging etc. It also includes logistical information such as schedules, transportation and dining; links to supplement the information learned and activities teachers undertake during the academy; includes photos of the academy staff and participants involved in science investigations and other activities from the previous academy.

Plans for 2009 & 2010

Within the next year, the NSRC will begin a comprehensive website redesign. Plans are to include moving much of the information into SQL databases, as well as increased media streaming.

Plans for 2011 & Beyond

NSRC also plans to continue to expand the site's teacher's resources section; add a substantial number of streaming media and online media including online courses; expand the student resources section to include online quizzes and games; and possibly add a blog.

4.4.17 National Zoological Park (NZP) & Conservation Research Center (CRC), http://nationalzoo.si.edu

Current Description

The National Zoo website is a portal to anything and everything at the Zoo, offering comprehensive information on our animals; on visiting and attending our activities and celebrations; on our educational materials and services; and on our research and conservation efforts.

Our animal collection is accessible through more than 15 webcams (our most popular feature), over 15 photo galleries, numerous fact sheets, and through our animal program pages. We offer services such as a calendar of events and schedule of daily activities, ticket sales for events, an online store and we accept donations online. Families, educators and students can also join FONZ and register for all our educational programs—from kid's classes to professional training.

Zoo science is accessible through our Conservation and Science section which offers descriptions of all our major research and conservation efforts. In addition, the Migratory Bird Center, Monitoring and Assessment of Biodiversity, and the Conservation GIS lab offer more in-depth information on their given specialty. Our Spotlight on Science and Spotlight on Vet Medicine are features that highlight science and vet stories of particular interest or significance.

Plans for 2009 & 2010

Our overarching mission is to enhance the experience of visitors to the Zoo, and to make that experience accessible to others who cannot visit it in person, as a part of the Zoo's mission to educate and inspire people about conservation of wildlife and their habitats. To do this we offer comprehensive all-inclusive information on every aspect of the Zoo in a user-friendly easy-to-find manner for our visitors.

To do this better we plan to launch an updated home page look-and-feel in early 2009, and research and implement a comprehensive content management and publication system over the next two years. These system, will allow us to integrate new and existing content into a seamless user-friendly interface that offers full access to the Zoo resources without overwhelming the visitor. As we improve our content management system we will continually be recruiting Zoo staff to contribute to and manage their areas of expertise.

Plans for 2011& Beyond

With better control of the content we hope to be able to expand our offerings to include additional multimedia such as audio, video, webcasts and podcasts. We hope to use these technologies to create new and enhance existing content; in particular we are looking at ways to expand our educational resources. Additionally we will be looking into redesigning the website as a whole.

4.4.18 Smithsonian American Art Museum, http://americanart.si.edu/

Current Description

The goal of the Smithsonian American Art Museum's (SAAM) website is to be the place to go for American art. SAAM currently has over 24,000 digitized artworks from its permanent collection available for free on its website. SAAM's Ask Joan of Art® online reference service answers art-related questions submitted by teachers, students, art professionals and museum visitors from all 50 states and over 31 foreign countries.

Plans for 2009 and 2010

SAAM has a history of accomplishment and leadership in the use of new technology. The museum is acutely aware that ideas about the role of the Internet in our society—what it does, who it's for, and how it relates to Institutions—have changed dramatically in the last several years. To find its place in this new environment SAAM is adopting Long Tail strategy—named for the recently discovered dynamic in which commerce and online cultures thrive around the niche interests of millions of passionate enthusiasts. SAAM's Long Tail strategy is about building vibrant and devoted audiences by putting as much content online as possible, making that content easy to find and use, and involving the public in process and personal exploration. Our Long Tail strategy must also include building the financial capacity to sustain our mission over time.

In this direction there is significant overlap with newly emergent ideas about the social and technological evolution of the Web, especially those that encourage open frameworks, microcontent, and cooperative relationships with user communities. (These concepts are sometimes given the moniker of *Web 2.0*.)

Plans for 2011 and Beyond

SAAM anticipates that out-years will involve an ongoing process of evaluating and refining its Long Tail strategy. There is a compelling need for a data-integration and data-access project that realizes the goals articulated in SAAM's 2005 Data Strategy. SAAM hopes to be able to fund a significant portion of its Web and New Media operation from private donations by the beginning of FY 2011.

4.4.19 Smithsonian Center for Education & Museum Studies (SCEMS), SmithsonianEducation.org

Current Description

The mission of the Smithsonian Center for Education and Museum Studies (SCEMS) is to increase the Smithsonian's impact as a national educational organization through the creation and dissemination of educational resources, by leading Institution-wide education initiatives, and offering programming. In 2003, SCEMS launched the website SmithsonianEducation.org, which represents education across the Institution. The site is a gateway for learners who identify themselves as Educators, Families, or Students—the three major sections of the website.

SmithsonianEducation.org makes the Institution's research, collections, and exhibitions more accessible through its searchable database of more than 1,600 items. The database includes everything on Smithsonian websites that would be useful and enriching in the classroom, according to the judgment of Smithsonian educators—more than 1,600 entries in all. Users can search by keyword, subject, grade and/or unit; since 2007 they can see how each resource aligns with the standards of learning in every state. Users may also rate and review the items, and SCEMS analyzes this feedback and presents it to the Smithsonian Council of Education Directors once a year.

The educational resources found through SmithsonianEducation.org include original lesson plans (many based on SCEMS's biannual publication, *Smithsonian in Your Classroom*, which is delivered to every elementary and middle school in the country), interactives, family activities and information, and professional development opportunities for educators. The site also serves as a registration point for a quarterly e-newsletter that delivers rich new Smithsonian content to an opted-in list of over 20,000 educators from across the United States.

SmithsonianEducation.org includes five history/heritage month pan-Institutional event calendars, related educational materials collected from across the Institution, and interactive virtual heritage tours added in January 2009.

Within SmithsonianEducation.org is Smithsonian Source (www.smithsoniansource.org), a resource for teaching American history that includes objects chosen for use in classroom teaching. Also, SCEMS maintains a website for students and practitioners in the field of museum studies, museumstudies.si.edu. Finally, SCEMS hosts intern.si.edu, a point of access for college students looking and applying for Smithsonian internships.

Plans for 2009 & 2010

Over the course of the next two years, the Center will continue to maintain and grow the educational offerings of SmithsonianEducation.org including a revision to the Heritage Resources section of the site. SCEMS is offering a series of pan-

Institutional online education conferences (beginning February 4 and 5, 2009) using a Software as a Service product, and SmithsonianEducation.org will incorporate archives of presentations being made by Smithsonian curators and educators.

In FY 2009, we are initiating a yearlong investigation into the audience use of and satisfaction with SmithsonianEducation.org using ASCI methodology. The program will run in parallel to a similar project on many other Smithsonian websites.

Plans for 2011 & Beyond

Revisions to SCEMS's websites during this planning period will largely depend on, and be driven by, the findings and recommendations of the user survey being conducted in FY 2009-10. We envision creating a platform for students, families, and educators to take advantage of the growing Smithsonian digitized collections to engage in participatory cultural activities.

4.4.20 Smithsonian Latino Center (SLC), http://www.latino.si.edu

Current Description

The Smithsonian Latino Center (SLC) is a pan-institutional unit that works with the entire network of Smithsonian museums, research centers, the National Zoo and over 140 affiliates nationwide to foster understanding and appreciation of contributions made by Latinos to history, society and culture.

The Smithsonian reaches well beyond its physical structures and offers substantial branding and education partnering opportunities. In this effort, the Smithsonian's National Outreach campaign places great emphasis on its online educational resources. One such example is the Smithsonian Latino Center's Website and the *Latino Virtual Gallery* (LVG). Within this online environment, we can reach far more people, and further explore issues of representation leveraging the success and popularity of interactive experiences particularly with younger audiences.

2008 Virtual Exhibitions and accompanying educational materials for:

- *The Division of Community Education of Puerto Rico (DIVEDCO)*
- *Roberto Clemente: Life After Baseball*
- *Musica del Pueblo*

SLC's *Latino Virtual Gallery,* a micro site to the Center's main website, is an online bilingual exhibition space that presents dynamic interactive exhibitions on Latino culture, history, science, art, society and the humanities in an effort to enrich the range and scope of Latino-focused exhibitions available to the general public and to educators. This micro-site continues to be a primary resource for accessing Latino resources and exhibition material.

Under a 2007 Latino Initiative Pool award, SLC was able to produce a comprehensive Web strategic plan for building a 3D virtual museum interface, Latino Virtual Museum (LVM), that will serve as a gateway to Smithsonian Latino collections, exhibitions and resources and presenting them in a way unique and innovative for the user to experience. Imagine…visitors will have the opportunity to experience items such as Celia Cruz "costumes", Frida Kahlo's letters and Fernando Botero's paintings in one place.

This will be the first time that Smithsonian museums will collaborate in merging their Latino digital assets "collections" to one main repository that will be hosted by the Center's virtual museum interface via the virtual world provider Second Life, a Multi-User Virtual Environment (MUVE). The emphasis will be on building community among visitors, teachers, children, researchers and the general public interested in Latino history, art and culture thereby improving access to Latino resources throughout the Institution via non-linear database navigation hosted from within a 3D virtual world. This new form and medium will also help us to better understand how we might want to inform and re-merge with our physical resources.

Within this virtual museum environment, SLC can reach far more people, and further explore issues of representation leveraging the success and popularity of experiences particularly with younger audiences. Interactive multimedia experiences have proven to enhance the learning experience.

In 2008, SLC purchased five islands in Second Life and together with Ohio University Vital Lab and the Smithsonian LVM Advisory team developed the conceptual, technical and design framework for LVM. The LVM Advisory Team includes members from OCIO, SI curators, scholars, researchers, museum educators, media artists, and other specialists working in a unique multidisciplinary work environment.

2008 Smithsonian Latino Virtual Museum Microsite progress:

- Featuring LVM blog, Flickr, YouTube, and Wiki sites.
- Other features include project demos from 2008 Museums and the Web International Conference in Montreal, Canada.

SLC also partnered with a second media lab in 2008, Boston College's Grid Institute, to establish best practices and standards for learning, working, and cultural exchange in virtual world environments. The first public collaboration in immersive educational cultural exchange in LVM took place November 2008 with the University of Aizu in Japan and the Grid Institute of Boston. Students and faculty at the University of Aizu were given a guided tour of LVM work in progress. Areas of interest included metadata integration and digital asset interpretation and representation within a 3D environment. (For more info on **Enabling Cultural Exchange on the Education Grid** go to *Immersive Education: ASIA* at http://mediagrid.org/news/2008-11_Immersive_Education_Asia.html)

Plans for 2009 & 2010

SLC will continue to build on its general website to ensure public awareness of Latino programs, exhibitions and resources at Smithsonian museums and its affiliates across the United States. Tactics we will use to implement our core goals and objectives emphasize the continual improvement of online communication, information and education. Modifications to the SLC website in 2009 will include a redesigned homepage and added Google search feature, a new calendar of events interface, a program and events blog, and new media section that highlights the new frontier in online learning…the museum Web 3.0.

The next step in the development of the Center's online assets is the *Latino Virtual Museum (LVM) beta version,* an avatar-based 3D immersive learning environment in Second Life. The beta version includes the Lobby and two wings of the museum. The main goal of this new media initiative is to provide digital access to Smithsonian's Latino treasures (collections and exhibitions) through database sharing and using backend technologies.

The LVM will be ground-breaking on two fronts: 1) it will deliver cutting edge technology for visitors to explore, research, interact and comment on important Latino artifacts; and, 2) it will make available for the first time, Latino collections from across the Smithsonian including paintings, sculpture, digital collections of literature, music, letters, newspaper articles, maps, oral histories online, and other objects to people who might never have the opportunity to travel to the Smithsonian Institution in Washington DC; and 3) serve as a model promoting open standards, open source software and open content within a collaborative virtual world ecosystem environment that includes Second Life, Wonderland and Croquet.

LVM will open to the public in March 2009. This launch will include a rollout out of the Lobby, the Music Wing and the Smithsonian Expeditions Wing. Formal evaluation and assessment of the LVM beta will be from March to September. 2009. The production of the Smithsonian Latino Art Collections Wing and the Latino Virtual Gallery will go into production in March-June 2009 with a launch of these two wings July 2009.

Phase II development for LVM goes into effect July 1, 2009 to develop a case study for best practice for developing science based immersive activities. Ohio University Vital Lab and SLC will work together with the Grid Institute in Boston to explore open standards and open file formats via the Education Grid. We will explore the Education Grid's ecosystem and provide various case scenarios on Wonderland and Second Life nodes. The continued development and evaluation and assessment of LVM in 2010, along with the research and development conducted in 2009 for Phase II of LVM will inform LVM's subsequent project scope.

Plans for 2011 & Beyond

SLC will continue to build on the infrastructure of the *Latino Virtual Museum* by establishing key relationships with Smithsonian units to survey the vast Latino resources and collections and assist in the digitization, conservation, preservation and promotion of *Smithsonian Latino Treasures*.

The Center will also continue to engage new trends and utilize new technologies as appropriate in an environment for best-practices. We will continue to build on our general website to ensure public awareness of Latino programs, exhibitions and resources at Smithsonian museums and its affiliates across the United States.

The continued emphasis on community building among visitors, teachers, children, researchers and the general public interested in Latino history, art and culture through our online educational initiatives such as LVM—will serve to improve access to Latino resources throughout the Smithsonian, and globally, via non-linear database navigation hosted within the Smithsonian Enterprise environment.

4.4.21 Smithsonian Environmental Research Center (SERC), http://www.serc.si.edu

Current Description

SERC's public website comprises nearly 18,000 files, 1.33 gigabytes, and currently clocks about 870,000 hits per month. Approximately two-thirds of the content describes the research programs and findings of our seventeen Senior Scientists. Other large sections include SERC's Education program (description, calendar of events, outreach, and volunteer opportunities) and our Professional Training opportunities (Internships, Fellowships). Employment opportunities, a bibliography of SERC publications and a directory of the staff are also provided.

Currently pages in the website are almost exclusively jsp pages that are created, edited and maintained using TeamSite and OpenDeploy. Many of the pages are generated through Teamsite templates, and two substantial portions of our site are generated dynamically from the BEA weblogic database (our personnel directory and calendar of events). The templated pages allow authors with limited Web skills to edit page content and produce new pages while preserving headers, menus, styles, and the general look and feel of the site. The database sections of our site allow for single-point updating of content on multiple pages and multiple display format of database content on different pages. Some downloadable research data is available, and much of this can be searched and selected using Cold Fusion technology. Content includes video clips and limited live data presentation.

Plans for 2009 & 2010

SERC's last major redesign in FY 2004 was carefully planned to provide flexibility for content modification and update. While the concept remains sound and continues to reflect our needs, the underlying technology has limited the function considerably. SERC has almost 20 non-technological users providing content to the site and one Web support staff member on part-time basis. Challenges rooted in technical complexity and support issues have led us to overhaul the back-end technology that supports the site.

In late 2008, SERC has determined a new coding strategy in conjunction with OCIO that will permit us to maintain our own pages by relying on a less complex architecture and aligning our support requirements to those that more closely parallel the skill-sets available from OCIO. A contractor is developing a new custom content management system utilizing ASPX coding and housing the majority of our website content in an SQL database. This redesign has been focused solely on the back end technology that supports the site, while keeping the current structure and look and feel intact.

We anticipate roll-out of this new system in early 2009. After the loss of the part-time Web support staff, we are seeking to resolve staffing issues through the hiring of a dedicated part-time technology webmaster and a part-time Web content manager.

Additional goals during this period will include defining our place in the proposed pan-Institutional Web presence, and ensuring that our pages are coded to maximize their visibility to major search engines (thereby increasing readership and value to the public).

Plans for 2011 & Beyond

Continue progress as outlined above.

4.4.22 Smithsonian Institution Archives, http://siarchives.si.edu

Current Description

The Smithsonian Institution Archives (SIA) maintains the Institution's official and historical records, providing access to Smithsonian history through a variety of tools and products. Through its website and related web-based tools, SIA expands access to its rich collections to an increasingly broad range of audiences ranging from the general public, to K-12 educational audiences and to scholars and researchers.

The website is a vehicle to search through SIA's collections, attend virtual exhibits, and to present other programs to understand the impact of James Smithson, the Institution, and the many contributions of its staff to the advancement of scientific knowledge and the preservation of our cultural

heritage. This website significantly expanded the number of web-accessible finding aids back in 2005, designing them to be fully searchable by popular Internet Search engines as well as the Institution's own Web search engine leading to a measurable increase in the use of its collections. Scholars may also limit their search to the SIA online finding aids only, if desired.

SIA also makes guidance available to archival and collections management professionals through its website, particularly in the areas of collections management and electronic records.

In 2009, SIA acquired responsibility for, and/or functions as the webmaster of, the following additional websites: http://jamessmithson.si.edu, http://www.150.si.edu, http://smithsonianimages.com; http://photos2.si.edu; and http://spin.si.edu. It functions as the webmaster of Smithsonian 2.0 (http://smithsonian20.si.edu) which incorporates a blog and a wiki. SIA also participated in the launching of the Smithsonian's Flickr Commons and has established a Facebook group, Smithsonian Institution Archives. It uses both to promote its activities and offerings.

Plans for 2009 & 2010

In 2009 and 2010, SIA plans to:

- Undertake an extensive updating of its web-based content across multiple websites to achieve a more cohesive and effective Web architecture
- Incorporate Web 2.0 technology to facilitate a better and more effective interaction with users of SIA collections
- Modify components of its websites to improve interaction and integration with pan-Institutional web-based initiatives
- Develop interactive functionality and components to extend reference and other services to remote visitors
- Leverage current Web technologies and services to extend the positive impact of its collection resources to new constituencies.

Plans for 2011 & Beyond

For FY 2011 and beyond, the SIA Web presence will continue to be an integral aspect of how SIA accomplishes its mission to serve the public, educational communities, and the Smithsonian Institution's communities around the globe; and to provide remote access to collection material.

4.4.23 Smithsonian Institution Libraries (SIL), www.sil.si.edu

Current Description

The SIL website serves two distinct communities, the internal Smithsonian research community and the public—from the general public through the external research community. To reflect this dichotomy, the SIL website has two distinct faces: The Galaxy of Knowledge and the Tools for the Researcher.

- The **Galaxy of Knowledge** (www.sil.si.edu) is the public face to the collections of SIL and as such provides general information about SIL, its collections, services to the non-Smithsonian staff public, and direct access to digitized collections.

  Smithsonian Institution Libraries has digitized over 1.35 million pages of text from its collections. These images represent thousands of individual titles. Access to the digital library is through an interface on the Galaxy of Knowledge as well as links from SIRIS (the Libraries' Integrated Library System) and through the Biodiversity Heritage Library portal (www.biodiversitylibrary.org). The digital collections available on the Galaxy of Knowledge include biodiversity heritage literature, trade literature, history of science, and art and design. The Galaxy of Knowledge also includes all of the Smithsonian Contributions and Studies Series.

- The **Tools for the Researcher** site (www.sil.si.edu/research/) serves as a portal and discovery tool focused on the Smithsonian researcher. The site provides links to electronic journals, databases, and other networked information sources that SIL purchases or from which content is licensed. *Tools for the Researcher* also provides Smithsonian specific research assistance (e.g. inter library loan request forms).

- A new initiative, launched in late 2006, is the **Smithsonian Digital Editions: Sources and Critical Interpretations**. This new series will focus on archival material enhanced by supplemental materials.

- As a supplement to the Galaxy of Knowledge, the **Smithsonian Institution Libraries' Galaxy of Image** selects the most appealing images from those in the SIL collections and makes them available to the public through a simple interface.

A service to Smithsonian scholars and administration is **Smithsonian Research Online** which is a collection of data listing articles, chapters and books authored by Smithsonian research staff. Its two components--Smithsonian Research Bibliography and Smithsonian Digital Repository--are themselves searchable via the SIL website. But the underlying data is also being re-used to dynamically populate museum and departmental websites where custom publication lists are generated and links to the digital edition are available.

Plans for 2009 & 2010

Increases in the page and item count to the *Smithsonian Contributions and Studies* series will be ongoing as new titles are published. Efforts will also continue to the *Sources and Critical Interpretations* series.

A major trade literature collection, Caldwell Lighting, will be added to the Galaxy of Knowledge. This collection is comprised of over 45,000 individual images, of which approximately 10,000 will be made available in 2009, with the remainder coming online in 2010. Additionally, the Trade Literature Inventory database will expose over 30,000 company names for which SIL has approximately 425,000 catalogs and other printed ephemera.

SIL will also see an increase in activity related to the Biodiversity Heritage Library (BHL) Project. This mass digitization effort will digitize a minimum of 2 million pages. Hosting and serving of these images will be through the BHL and the Internet Archive. However, it is SIL's goal that archived copies of these files will be hosted on the Smithsonian campus.

The *Tools for the Researcher* site will continue as the primary access tool for Smithsonian researchers to access third party resources procured by SIL. SIL will look for additional ways to enhance the *Tools for the Researcher* site.

Plans for 2011 & Beyond

Mass digitization from SIL's natural history collections will near completion. SIL will generate upwards of 20 million pages of scanned text. Mass digitization efforts will continue for the SIL trade literature collections (approximately 450,000 titles). Scanning of important and unique portions of SIL's art and design collections will be underway. *Tools for the Researcher* will be enhanced to present content to users in a customizable interface.

Future pan-Institutional initiatives which SIL could leverage would include a robust digital asset management system to enable SIL to effectively store and serve its digital content; and online payment for licensing and donation.

4.4.24 Smithsonian Photography Initiative, www.photography.si.edu

Current Description

The Smithsonian Photography Initiative (SPI) exists to increase public understanding of the photography collections from the Smithsonian's 19 museums, 9 research centers, and the National Zoo. SPI's websites serve as a dynamic introduction to the photography collections, resources, and experts across the Institution. SPI's main website (http://photography.si.edu/), presents a cross-sample of photographs (http://photography.si.edu/SearchImage.aspx) which represent the over 700 Smithsonian collections documenting history, art, culture and science, as well as the activities of the Smithsonian itself. SPI guides researchers and the general public alike to the multiple archives and collections at the Institution via its map of photography (http://photography.si.edu/Collection.aspx).

In March 2008, SPI launched **click! photography changes everything** (http://click.si.edu) to stimulate an unprecedented dialogue about the ways photography enables people to document and actively interact with the world. In October 2008, the second phase of **click!** launched, inviting the public to contribute their own thoughts and photos, alongside invited guests, dramatically altering the traditional one-way, curator-to-visitor dynamic. SPI also provides lesson plans related to **click!** (http://www.click.si.edu/ForTeachers.aspx) for grade 6-12 teachers to enable visual literacy discussion in the classroom.

SPI leads the Smithsonian's effort to 'increasing the diffusion' of the Smithsonian's photographic collections to a popular online photo sharing site and community, Flickr. The Smithsonian joins over twenty national and international libraries, museums, and archives on the Flickr Commons (http://www.flickr.com/commons), a special area of the site presenting "the hidden treasures in the world's public photography archives." To date, the Smithsonian's 'photostream' (www.flickr.com/photos/Smithsonian) includes nearly 1500 photos from ten Smithsonian divisions which have generated over 1.5 million unique views in eight months.

Participating in the Flickr Commons is part of an emerging strategy to "go where they are" in the Web 2.0 environment. Participation in the Commons increases public knowledge of and access to the Smithsonian's digital image collections, cultivates a Smithsonian online community, and improves public outreach since we are able to observe the public's interests and enhance the documentation and interpretation of our collections using the knowledge, perspectives, and experiences of these audiences.

Plans for 2009 & 2010

In 2007, OCIO and SPI jointly applied for and received a grant from the Getty Foundation to fund Phase 1 of EDAN - Enterprise Digital Asset Network. The goal of EDAN is to increase the public's access to the collections held across the Smithsonian's major library, archive, and museum systems. EDAN will allow SPI,

along with other Smithsonian programming units (Latino Virtual Museum, Smithsonian Center for Education and Museum Studies, etc.) to more easily develop and present programs across Smithsonian collections while maintaining the integrity of the units digital media files and associated metadata. (Phase I expected launch: September 2009). As a result of EDAN, SPI is planning a major redesign of their main website (http://photography.si.edu) to better reflect the new programs and resources developed since its launch in 2006.

In 2009, SPI launched THE BIGGER PICTURE (http://blog.photography.si.edu), a blog for Smithsonian collections managers, archivists, curators, and researchers to hold a discussion about photography and the Smithsonian. THE BIGGER PICTURE gives Smithsonian staff a venue to share images and insights related to their everyday work and special projects at the Smithsonian with colleagues and Smithsonian photography enthusiasts alike. Smithsonian is currently identifying staff to serve as contributing editors to host mini-forums around special areas of interest. The blog also serves as a way for Smithsonian staff to tell the interesting stories around the collections distributed to Web 2.0 social media environments such as the Flickr Commons. Plans to expand THE BIGGER PICTURE include a forum for teachers to discuss how they use Smithsonian digital media collections which will guide SPI in the development of their visual literacy resources, another area of expansion for 2009/2010.

Throughout 2009/2010, SPI will issue theme-based calls-for-entry to **click! photography changes everything** (http://click.si.edu) tied to cultural heritage months, national and international holidays, and current events. To increase the public's knowledge of the 'calls to action,' SPI has developed new online marketing tools (social media releases and blog outreach) and will continue to refine those to better reach online Smithsonian audiences.

Plans for 2011 & Beyond

Continue to provide the public access to newly available digitized photographs from across the Institution; incorporate new technologies to improve access to the collections and associated resources; continue to present online educational activities and programming related to photography at the Smithsonian; develop more partnerships with other Smithsonian units; and continue to publicize Smithsonian photography units by creating programs that bring attention to their collections.

4.4.25 Smithsonian Institution Traveling Exhibition Service (SITES), www.sites.si.edu

Current Description

The SITES website serves both the general public and members of the professional museum community. Web analytics indicate that other museum professionals (chiefly those who want to schedule one of SITES' traveling exhibitions) appear to be our primary constituents. As such, the website contains information that allows professionals to view our exhibitions at a glance, with basic content and design information as well as registrarial specifications and travel itineraries available within two or three clicks of the homepage. The website also features content for teachers and members of the press, including but not limited to curriculum guides, brochures, newspaper articles and more (often in the form of .pdf files). Of the hundreds of pages in SITES' Web portfolio, most are simple hand-generated .html pages (with some .asp content), created in Dreamweaver and deployed through OpenDeploy.

SITES manages several other websites, most notably www.earthfromspace.si.edu, www.corridos.org, and www.robertoclemente.si.edu. The most lauded of these three is the *Earth from Space* site (launched in 2006) which allows visitors to zoom in on images captured by space satellites. The same site also boasts comprehensive lesson plans and didactic images about the satellites themselves. The *Beyond Baseball: The Life of Roberto Clemente website* is the most thorough look at the ballplayer's life available on the Web and includes videos and a bilingual podcast, as well as a host of interactive trivia questions and games.

SITES has jumped into Web 2.0 with presences on Facebook and YouTube. The YouTube channel features 13 videos of various types, some exhibition "snippets," akin to short movie trailers, and other more lengthy exhibition-related videos that complement the content in current traveling exhibitions. We have also launched our first exhibition-based wiki (January 2009) and will monitor how it is received by the general public.

SITES maintains several blogs which are drawing a growing number of followers in professional museum circles and among the public: Main blog (www.shows2go.si.edu), Museum on Main Street blog (http://www.blog.museumonmainstreet.org/), and Exhibition-related blog (http://www.shows2go.si.edu/hatch_show_print/). Although topics vary, most relate to behind-the-scenes snapshots of exhibit preparation or talks with curators and/or directors. The site's photo albums give us an opportunity to display program or exhibit related images.

Plans for 2009 & 2010

- Add more podcasts to portfolio
- Increase the number of instructional and informative videos online
- Offer advanced exhibitor materials digitally
- Include a more thorough search function to all pages
- Create a more comprehensive system of archiving old exhibitions
- Incorporate Smithsonian-wide calendaring tool
- Create a comprehensive site map for visitors
- Better file management of unused and orphaned files

Plans for 2011 & Beyond

A total redesign is expected during the planning period to improve functionality, integrate dynamic completely updated content, and to integrate TeamSite. The site was last redesigned back in 2005.

4.4.26 Smithsonian Tropical Research Institution (STRI), www.stri.org

Current Description

The STRI website—available in both English and Spanish versions—supports STRI's mission to increase the understanding of the past, present and future of tropical biodiversity and its relevance to human welfare. Added in 2006, the Bioinformatics website has significantly increased awareness of and access to STRI's scientific data and information.

Plans for 2009 & 2010

In 2009 & 2010, plans are to improve the usability of the STRI website by restructuring the website so that all the information is organized in a more logical way. Also, work on making the look and feel of the website more modern. We will improve and secure all of our forms and make all of them electronic. We will also be teaching scientist and specific Web savvy personnel how to post and edit their own articles and upload images to maintain the freshness of the content on the website.

In addition the STRI Kid's website is undergoing a redesign. In 2009, we will conduct a usability testing of this site with children as the testers to study their behavior and measure the "ambient findability" on the website.

The Office of Bioinformatics will continue to add new scientific content-based websites as well as new web-based tools that allow users to explore and use the data more effectively. Biological and image digitization projects will continue to generate more content. All of the pages in Bioinformatics will be redesigned and restructured to make it more user-friendly.

Plans for 2011 & Beyond

In 2011, STRI's website will have graphic re-design according to the current Web standards, best practices and technical requirements to improve performance and management of the site.

Also in 2011, the STRI Kid's website will have a content update to expand the target audience (from 5 years old to 10 years old, up to 12/13 years old kids), and a graphic redesign to match the current Web standards and best practices.

By 2013 all biological collections will be digitized and on-line. All collections and taxonomic databases will be integrated with global projects such as GBif and the Encyclopedia of Life. Digitization of slide and photograph collections will continue. New scientific content-based websites as well as new web-based tools will continue to be added.

4.4.27 The Smithsonian Associates (TSA), ResidentAssociates.org

Current Description

The Smithsonian Associates (TSA) offers a stunning variety of educational programs and study tours that open the doors to the Smithsonian's world of opportunity. Established 44 years ago as the membership, cultural, and educational arm of the Smithsonian Institution, The Smithsonian Associates is recognized as the World's largest and most esteemed museum-based continuing education program.

TSA manages eleven websites, two of which are e-commerce enabled:

- ResidentAssociates.org (e-commerce)
- YoungBenefactors.org (e-commerce)
- DiscoveryTheater.org (tickets sold via ResidentAssociates.org)
- ArtCollectorsProgram.org
- CivilWarStudies.org
- KiteFestival.org
- ScholarsInTheSchools.org
- SmithsonianAssociates.org
- SmithsonianExperiences.org
- SmithsonianJazzCafe.org (being discontinued)
- VoicesOfDiscovery.org

The Resident Associate Program began selling event tickets and memberships online in 1997. Sales have grown over the years and in FY 2008, online sales for Resident Associate Program tickets and membership, Discovery Theater tickets, and Young Benefactor tickets and membership totaled $1.8 million, or 60% of Resident Associate tickets being sold online.

These three websites share an integrated customer database using Tessitura, where customers can login and update contact information on a “My Account Page,” subscribe to eNewsletters and eALERTs by topic, and where customer prospects can register on the websites and request free catalogs. eNewsletters, eRenewals, email solicitations, and the tracking of online marketing efforts are all integrated into the customer relationship management system. Much of the transactional data is available through a new Tessitura-integrated software product, T-Stats, which uses data cubes to allow for quick reporting and data analysis.

Once a customer has established an online account, he/she can purchase memberships, renew or upgrade an existing membership, purchase tickets with discounts based upon the membership level, purchase and redeem gift certificates, make a donation through a donation page or through the shopping cart as an add-on contribution to a ticket or membership purchase.

On ResidentAssociates.org, event data is dynamically pulled from the Tessitura event database, allowing for a "May We Suggest" feature on most event pages, static Featured Recommendations on the home page, as well as custom Featured Recommendations to be displayed based upon a customer's eALERT subscriptions or purchase history. These features have increased the number of Web pages viewed per visit and increased the purchase rate for those visitors who use these features.

The smaller websites, such as KiteFesitival.org and ScholarsInTheSchools.org, have been designed to distribute information about specific outreach programs and to serve as a promotion and communication tool. Most of these websites have their own eNewsletter or email list, e.g. CivilWarStudies.org which is over ten years old now and helps to promote both Resident Associate and Smithsonian Journeys Civil War programs and tours.

Plans for 2009 & 2010

Further enhancements to the ResidentAssociates.org website will include the ability for customers to have more features on the My Account page, e.g. to request email reminders for ticketed events, the display of ticketed events for that account, additional designations for contact preferences, dynamic membership upgrade offers, dynamic membership expiration reminders, display of calculated discount savings based upon membership level, etc.

Additional enhancements for promotional offers and discounts will be implemented to allow for both membership and ticket discounts to be offered using promotion source codes and restricting offers by online Campaign Appeals. This process can also be used to allow members of event co-sponsoring organizations to access discounted prices, e.g. with promotion source codes, NMAI members could receive discount pricing to events ticketed by the Resident Associate Program.

All TSA event-producing units will be participating in the new pan-Institutional calendaring project (Trumba). This will allow all TSA Washington, D.C. based programs to be listed on the pan-Institutional calendar. The event listings will also be syndicated with Eventful.com In addition, most all of the TSA programs are also listed on CultureCapital.com, which is a project sponsored by the Cultural Alliance of Greater Washington.

In the summer of 2009, the implementation of the new version of the email deployment software, formerly Tessitura Messaging System, now Wordfly (Wordfly.com) will allow the use of triggered emails based upon specific pre-determined criteria and using custom templates with dynamic content. Wordfly will be able to directly access the Tessitura account contact information, rather than requiring and export/import process as is now the case.

An additional shopping cart is being developed to allow for the online registration of Smithsonian Summer Camps, which requires the collection of child-specific information and parental releases. In addition, a new shopping cart is planned for ArtCollectorsProgram.org, which will include additional steps for merchandise sales, e.g. calculation of shipping costs, selection of delivery options, etc.

The Resident Associate Program also anticipates the implementation of Print@Home tickets for selected programs to help reduce postage and printing costs. The extension of Print@Home tickets for all programs will be dependent upon the ability of Smithsonian venues to install secure WiFi access to the TSA Tessitura database.

CHAPTER 5
FINANCE & ADMINISTRATION PROGRAM AREA

5.1 Overview

The Institution is responsible for more than 6,000 employees, 400 buildings in Washington DC and elsewhere around the world, a substantial endowment that has grown from the original half-million-dollar bequest of James Smithson with more than half-a-billion dollars in annual operating costs for which Congress appropriates about 73%. The balance of the operating funds comes from Institutional Trust funds—endowment income, gifts, grants, and earnings on revenue-producing activities. Whatever their source, all funds are those of a public trust and subject to the highest standards of accountability.

The Smithsonian uses multiple automated information systems and applications to comply with those standards, to employ and pay its people from accountants to zoologists who may operate telescopes, repair the Star-Spangled Banner, feed animals, protect treasures, mount exhibitions, and keep its buildings safe, clean, and open to visitors every day of the year except December 25th.

The Smithsonian's ERP system encompasses the implementation of a suite of commercial-off-the-shelf financial management, supply chain management, and human resources modules to modernize the Smithsonian's processes and meet its financial and human resources management needs. In October of 2002, the Institution replaced its technologically obsolete financial and purchasing systems with modern products that support federal requirements and provide the controls necessary to ensure reliable financial information supporting informed operational decisions. The new system is used by management at all levels and provides monthly planned versus actual information used for a quarterly operational review process with the Secretary and Under Secretaries.

The largest of the systems supporting the Institution is the Enterprise Resource Planning system which encompasses the implementation of a suite of commercial-off-the-shelf financial management, supply chain management, and human resources modules implemented to modernize the Smithsonian's processes and meet its financial and human resources management needs. The Smithsonian has also implemented a Facilities Management System that is used to manage the space and maintenance of its buildings and structures and the assets within those buildings and structures. In addition to these major systems, the Institution has a variety of other systems that support the Finance and Administration that are detailed in the following sections. These systems include those that are currently in-place, are undergoing modernization such as our Identity Management System, and new systems such as the

Electronic Records Management System that will support the Institutions efforts to be a leader in good governance.

Program Area Snapshot: Finance & Administration – Financial Management
LOB: Financial Management (402); Supply Chain Management (405); Administrative Management (401)

Retired	Production (2009)	Planned (2010 to 2014)	
		Funded	Unfunded
• N/A	*Target Architecture:* • ERP Financials • Endowment Management System *Candidate for Replacement:* • PAYES (FY 2010) • PCMS • FarSight • FT2000 • PFITS • APS-II • Grants Management System • PACTS	• Complete implementation of the ERP Project Cost Accounting • Implement the ERP Grants and Contracts modules • Replace PAYES with integration of the Time and Labor module to ERP Financials	• Additional ERP Financial Modules

Future Considerations / Performance Gaps

- As the ERP Financials functionality is expanded, the objective is to retire many of the remaining financial cuff systems used throughout the Institution.
- There will be a growing need to implement e-commerce systems for pan-Institutional use.

Program Area Snapshot: Finance & Administration – Human Resources Management
LOB: Human Resources Management (403)

Retired	Production (2009)	Planned (2010 to 2014)	
		Funded	Unfunded
• N/A	*Target Architecture:* • ERP HRMS • STARS • MedGate • NFC Payroll/Personnel System *Candidate for Replacement:* • MEARS • PFITS • Accu-Trax • FRCalc • GLC Lookup • Label Generator for AOs/Directors	• e-Performance I HRMS	• eOPF

Future Considerations / Performance Gaps

- As the ERP HRMS functionality is expanded and eOPF developed, the objective is to retire the remaining legacy custom applications supporting the Office of Human Resources.

Program Area Snapshot: Finance & Administration – Inventory Management
LOB: Supply Chain Management (405)

Retired	Production (2009)	Planned (2010 to 2014)	
		Funded	Unfunded
• N/A	*Target Architecture:* • Warehouse Inventory Management System • Surplus/Excess Property Mgmt Asset System	• N/A	• N/A

Program Area Snapshot: Finance & Administration – Documents & Record Management
LOB: Information & Technology Management (404)

Retired	Production (2009)	Planned (2010 to 2014)	
		Funded	Unfunded
• N/A	*Target Architecture:* • Enterprise Engineering Document Management System • NZP Synapse • Legal Information System	• N/A	• Electronic Records Management System

Program Area Snapshot: Finance & Administration – Facilities & Safety Management
LOB: Administrative Management (401)

Retired	Production (2009)	Planned (2010 to 2014)	
		Funded	Unfunded
• Hazardous Materials System	*Target Architecture:* • FMS • NZP Chemical Applications • Fleet Management System	• N/A	• Parking Management System N/A

Program Area Snapshot: Finance & Administration – Security Management
LOB: Administrative Management (401)

Retired	Production (2009)	Planned (2010 to 2014)	
		Funded	Unfunded
• N/A	*Target Architecture:* • N/A	• MIS: OPS • IDMS • Disaster Management Planning System • Security Incident Reporting System	• N/A

Program Area Snapshot: Finance & Administration – Other Administration Systems
LOB: Administrative Management (401); Internal Risk Management & Mitigation (302); Controls & Oversight (301); Public Affairs (305)

Retired	Production (2009)	Planned (2010 to 2014)	
		Funded	Unfunded
• Travel Manager (2007)	*Target Architecture:* • E-Gov Travel Service • IRS • VCMS • Correspondence Tracking System *Candidate for Replacement:* • Risk Management Contractor Insurance Program • EMS • GMS • PACTS • OIG Case Management System	• n/a	• n/a

Future Considerations / Performance Gaps

- There will be a growing need to implement contact management and donor management systems for pan-Institutional use.

5.2 Financial Management

5.2.1 Enterprise Resource Planning (ERP) Financials Management System

Line of Business	Sub-function
Financial Management (402)	Accounting (124) Funds Control (125) Payments (126) Collections & Receivables (127) Asset & Liability Management (128) Reporting & Information (129)
Supply Chain Management (405)	Goods Acquisition (143) Services Acquisition (146)
Planning & Budgeting (304)	Budget Execution (105)

a. Description

The Smithsonian's ERP project encompasses the implementation of a suite of commercial-off-the-shelf financial management, supply chain management, and human resources modules to modernize the Smithsonian's processes and meet its financial and human resources management needs. In October of 2002, the Institution replaced its technologically obsolete financial and purchasing systems with modern products that support federal requirements and provide the controls necessary to ensure reliable financial information supporting informed operational decisions. The new system is used by management and staff at all levels and provides monthly planned versus actual information to support the Institution's quarterly operational review process with the Secretary and Deputy Secretary.

The Institution has continued to implement additional capabilities of the financials system:

- deployed a solution for complex procurements in FY 2005
- upgraded (FY 2004) and integrated (FY 2005) a legacy travel system to support the Institution's travel processes until the e-Travel solution was implemented in FY 2007
- deployed an integrated asset management module in FY 2006 to manage accountable and real property assets
- expanded reporting capabilities to support the growing needs of program areas

In FY 2007, the ERP project completed the accounts receivable and billing modules, implemented a time and labor front end module, and an interface with the eGov Travel System (ETS). The upgrade of the Financials modules was initiated.

In FY 2008, the ERP project worked on the upgrade of all deployed Financials modules to Peoplesoft 9.0. In FY 2009, we will deploy the upgraded Financial System, complete the development and deployment of the FPDS interface, and begin work on implementing the project cost accounting, grants, and contracts modules. In FY 2010, the current ERP project plan is to complete and deploy the project cost accounting, grants, and contracts modules.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Establish Automated Resource Management Committee to analyze administrative systems	04/1998		04/1998
Complete analysis of administrative systems	07/1999		07/1999
Capital Planning Board approval	11/2000		11/2000
Acquire ERP product	03/2001		03/2001
Establish Integrated Product Team	07/2001		09/2001
Define chart of accounts	12/2001		01/2002
Pilot general ledger, accounts payable, and purchasing modules	05/2002		07/2002
Deploy general ledger, accounts payable, and purchasing modules	10/2002		10/2002
Define project & activity types	03/2003		08/2003
Implement project cost accounting	10/2004	05/2010	
Deploy grants & contracts modules	10/2004	06/2010	
Integrate *Travel Manager System* with PeopleSoft	08/2004		08/2005
Deploy asset management capability	10/2004		05/2006
Deploy complex contracting (procurement module)	10/2004		07/2005
Integrate E-Government Travel System (ETS) with ERP Financials	04/2007		04/2007
Deploy accounts receivable & billing modules	10/2004		09/2007
Upgrade financials modules from version 8.4 to version 9.0	07/2007		01/2009
Deploy time & labor module (front-end)	10/2004		09/2008
Deploy time & labor (backend)	10/2004	09/2009	

c. Benefits

The ERP investment supports the third strategic goal in the Smithsonian's FY 2006 performance plan: enhanced management excellence that seeks to modernize Smithsonian management systems and bring each of them to a level of quality and sophistication appropriate to an organization of the size and complexity of the Institution. In doing so, it has or will replace 27 financial systems used throughout the Smithsonian.

It also supports two objectives associated with that goal:

- Modernize the Institution's financial management systems and functions.
- Modernize the Institution's information technology (IT) systems and infrastructure.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2002	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

5.2.2 Payroll Accounting Distribution System (PAYES)

Line of Business	Sub-function
Financial Management (402)	Accounting (124)

PAYES is a stand-alone system created to transform time, attendance, and pay information from the National Finance Center (NFC) into accounting transactions. It processes NFC data and allocates costs by codes for general ledger, sources, organizations, objects/revenue, accounts, and designations. The system makes payroll data available for posting to the general ledger on a bi-weekly basis, rather than monthly, which assists units in evaluating available balances and funding status. The Time & Labor module of the ERP system is planned to replace PAYES in FY 2009/FY2010.

Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	1990s
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• SI-wide

5.2.3 FarSight

Line of Business	Sub-function
Financial Management (402)	Funds Control (125)
Planning and Budgeting (304)	Budget Formulation (101)
	Budget Execution (105)

A PC-based reporting, query, and analysis tool, *FarSight* supports day-to-day financial tracking and budgeting. Each of the units listed below uses versions of *FarSight*.

Funding Status (FY09):	X Fully Funded Partially Funded Not Funded
Production Date:	1990s
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• NMAI • NZP • OEC • OPS • OUSS

5.2.4 Financial Tracking System (FT2000)

Line of Business	Sub-function
Financial Management (402)	Funds Control (125)

Tailored to the accounting structure for each of the units that follow, FT2000 provides multiple-user reporting tools and access to financial information that is more timely and accessible than the Institution's monthly accounting reports.

Funding Status (FY09):	X Fully Funded Partially Funded Not Funded
Production Date:	2000
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• HMSG • SITES

5.2.5 PFITS

Line of Business	Sub-function
Financial Management (402)	Funds Control (125)

As a PC-based reporting, query, and analysis tool, *PFITS* supports day-to-day financial tracking and budgeting for the Facilities Capital Program.

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	1990s	
Enterprise Architecture:		Target Architecture
	X	Candidate for Replacement
Units Supported:	•	OFEO

5.2.6 APS-II, Portfolio Management System

Line of Business	Sub-function
Financial Management (402)	Accounting (124) Funds Control (125)

APS-II is a commercial-off-the-shelf portfolio management system from Sunguard Treasury Systems, Inc. It allows the Office of the Treasurer to manage short-term Smithsonian investments by keeping detailed information on each security owned and by detailed analysis and reporting.

During the planning period, we expect to replace this system with requirements gathered in FY 2008.

Funding Status (FY09):		Fully Funded Partially Funded Not Funded
Production Date:	2004	
Enterprise Architecture:		Target Architecture
	X	Candidate for Replacement
Units Supported:	•	OT

5.2.7 Endowment Management System (EMS)

Line of Business	Sub-function
Financial Management (402)	Accounting (124) Funds Control (125)

The Endowment Management System (formerly called the Smithsonian Investment Management System, SIMS) is an Access database that maintains administrative and financial data on Smithsonian endowments, investment managers, and custodian banks. Management, units, donors, and auditors require various kinds of information about each endowment, classes of endowments, and total endowments. EMS has online query and reporting capabilities and interfaces with the ERP system.

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	Oct 2008	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	• OT • OD	• All units with endowments

5.2.8 Grants Management System (GMS)

Line of Business	Sub-function
Financial Management (402)	Funds Control (125)

The Office of Sponsored Projects (OSP) developed and maintains a grant management system database that tracks and reports, using Crystal Reports, all sponsored project proposals and awards. OSP and other Smithsonian staff use the database for management and reporting purposes.

Eventually some, if not all, of these uses will be replaced with comparable functionality in the ERP system when it becomes available.

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	1997
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• OSP

5.2.9 Post-Award Compliance Tracking System (PACTS)

Line of Business	Sub-function
Financial Management (402)	Funds Control (125)

The Office of Sponsored Projects (OSP) is using Microsoft Excel to develop a compliance tracking system database. PACTS is currently used for billing, accounts receivable, cash collections, reporting, invoicing, and other areas of compliance in order to improve financial and cash management of externally funded grants and contracts.

Eventually some, if not all, of these uses will be replaced with comparable functionality in the ERP system as it becomes available.

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2002	
Enterprise Architecture:		Target Architecture
	X	Candidate for Replacement
Units Supported:	•	OSP

5.2.10 Purchase Card Management System (PCMS)

Line of Business	Sub-function
Financial Management (402)	Payments (126)

The PCMS uses a commercial Web-based ERP card management system for credit card program management, administration, reporting, and inquiry. The system provides secure online statements to redistribute purchase card charges with or without associated purchase order encumbrances. The PCMS also provides the capability to consolidate purchase card charges for vouchering and payment in the ERP Accounts Payable system. Since implementation of the ERP Purchasing module in October 2002, transaction review, approval, and redistributions of charges have been performed within the ERP system.

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	1990s	
Enterprise Architecture:		Target Architecture X Candidate for Replacement
Units Supported:	•	OCon

5.3 Human Resources Management

5.3.1 Enterprise Resource Planning Human Resources Management System (ERP HRMS)

Line of Business	Sub-function
Human Resources Management (403)	Staff Acquisition (251)
	Benefits Management (254)
	Employee Relations (256)
	Employee Development & Performance Management (255)
	Labor Relations (228)
	Compensation Management (253)
	Organization & Position Management (252)
	Separation Management (257)

a. Description

The Institution's Office of Human Resources (OHR) assists program areas in achieving their missions by providing recruiting, compensation and recognition, planning and consulting, employee and labor relations, and training services. All managers need meaningful and accurate information about their employees in order to meet the increasing demand to promote intellectual progress, particularly in science, and to apply sophisticated management strategies to Institutional activities.

In the past to meet these needs, the Smithsonian relied on multiple automated systems with limited functionality and out-of-date technology. As was the case of its financial management systems, the Smithsonian has had no way to capture human resources data at the source and re-use it for multiple purposes, which have resulted in errors, extra work, and re-work. Units also had to develop *cuff* systems to maintain personnel information, but these systems did not provide timely information needed by managers and employees in the units and OHR.

By replacing these systems with the Human Resources Management modules of the ERP system, information is immediately available allowing OHR to deliver the services required far more effectively. In addition, planned improvements to the management of core human resources activities replaced current labor-intensive paperbound processes.

The ERP HRMS team began working in April 2003 to implement the PeopleSoft HRMS. All four of the original HRMS ERP implementation phases were completed in FY 2005:

- **Phase 1:** The HRMS system initially was deployed in October 2004 providing functionality to allow units to submit personnel actions to OHR electronically via the ERP system. In December 2004 the Smithsonian began full production use of the Phase 1 functionality of the ERP HRMS system by automating core human resource management activities: personnel action processing, a bidirectional interface with the National Finance Center for personnel actions, awards, reporting, and security. Support for processing base benefits transactions was subsequently added May of 2005.

- **Phase 2:** Implemented functionality to support managing labor and employee relations processes—including support for tracking disciplinary actions and grievances. This phase also included expanded workflow capabilities providing an additional approval level for actions within units prior to the action being routed to OHR.

- **Phase 3:** Implemented functionality to support the management of health and safety related processes. These processes include clinic visit scheduling, recalls, and recordation; tracking various tests including audiometric, vision, and pulmonary function; immunization program management; and case management for occupational and non occupational injuries and illnesses. This phase also provided functionality to support training administration processes.

- **Phase 4:** Implemented functionality to support succession planning, career planning, competencies, and performance management.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Establish Human Resources Steering Committee	05/2003		06/2003
Establish HR ERP work groups	07/2003		07/2003
Pilot core PAR processing, basic employee benefits & awards modules	07/2004		07/2004
Deploy PAR processing, NFC interface, basic workflow to units	09/2004		12/2004
Deploy employee & labor relations processing	04/2005		04/2005
Deploy expanded workflow, training, health and safety, and extended benefits processes	04/2005		07/2005

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Deploy succession planning, career planning, competencies, and performance management	04/2005		09/2005
Integrate People Soft with online recruiting STARS	07/2006		02/2007
Deploy the AIRS module which provided the capability to send workers' compensation CA1 forms electronically to DOL	05/2006		04/2007
Deploy interface with SI Time and Attendance(webTA)	03/2008		03/2008
Deployment of Automated Employee Exit Clearance	05/2008		05/2008
Deploy Pilot for automated/workflow for Performance Management	06/2009		
Deploy 9.0 People Soft HRMS	12/2009		

c. Benefits

The ERP investment supports the third strategic goal in the Smithsonian's performance plan: enhanced management excellence that seeks to modernize Smithsonian management systems and bring each of them to a level of quality and sophistication appropriate to an organization of the size and complexity of the Institution.

It also supports two objectives associated with that goal:

- Modernize the Institution's information technology (IT) systems and infrastructure.
- Recruit, hire, and retain a diverse workforce and promote equal opportunity in all aspects of the Smithsonian's employment and business relationships.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2004	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	• OHR	• SI-wide

5.3.2 Smithsonian Tracking & Applicant Referral System (STARS)

Line of Business	Sub-function
Human Resources Management (403)	Staff Acquisition (251)

a. Description

The Smithsonian Tracking & Applicant Referral System (STARS) assists the Institution's Office of Human Resources (OHR) program areas in achieving their missions by providing secure, globally accessible, online recruiting services. STARS is the Smithsonian's implementation of the *Hiring Management* solution interfacing with both USAJobs (the United States Federal Government's official job website) and the Smithsonian's core ERP HRMS system.

Since the e-Government initiative, the current trend in the Federal recruitment field is leaning more and more toward online recruiting and specifically the *Hiring Management* solution. Over 100 Federal, state, and local government agencies have implemented this solution and have had immediate success. One of the reasons that *Hiring Management* is so widely accepted is that it is tailored for the Federal marketplace requiring very little customization of the software for implementation and as such the overall implementation time is reduced as well as the cost. *Hiring Management* is also integrated with USAJobs—an objective in the President's Management Agenda.

With *Hiring Management*, the power of the Internet is used to build and post vacancies directly to the USAJobs' website. Interested job applicants review and apply to vacancy descriptions online and answer position-specific questions. The system automatically collects and processes employment application information and applicant personal data; rates and ranks applications using weighted criteria as specified by our agency—including giving veteran's preference—resulting in a presorted applicant pool; and provides email notifications to applicants throughout the application and selection process. The HR staff and hiring manager's valuable time is spent looking only at the best candidates.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Concept & Requirements Phase	11/2005		09/2005
Deploy online recruiting, aka "Hiring Manager, " integrated with USA Jobs	07/2006		01/2006
Integrate online recruiting with PeopleSoft HRMS	07/2006		02/2007

c. Benefits

Job seekers today have easy access to thousands of online job postings, many of which already offer online applications and timely feedback to the applicant. At the Smithsonian, the average time previously required from when a vacancy closes to when a candidate is selected to fill the vacancy was 84 workdays—*nearly three months*. In FY 2006, this time was reduced to 63 days or 25% reduction in time. If the Institution is to vie for the best-qualified candidates, it must be able to offer its candidates a fast and easy way to apply for a vacancy; and to check the status of their application, and to reduce the overall time needed to fill openings.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2006	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	• OHR	• SI-wide

5.3.4 Occupational Health and Safety System (MedGate)

Line of Business	Sub-function
Human Resources Management (403)	Benefits Management (254)

a. Description

Medgate complements HRMS and provides for additional functionality that is needed by the Office of Safety, Health and Environmental Management Staff to

be compliant with related health, safety, productivity, disability management, and regulatory compliance issues (ADA, FMLA, OSHA, and HIPAA). Medgate provides for integration of special equipment for tracking audiometric, vision, pulmonary and respirator fit testing, immunizations, clinical testing, case management, scheduling and surveillance recalls, incident tracking, absence tracking, environmental monitoring, along with standard letters and OHSA reports.

b. Benefits

The Medgate initiative supports the Smithsonian strategic goal to modernize Smithsonian management systems by bringing each of them to a level of quality and sophistication appropriate to an organization of the size and complexity of the Institution. The initiative supports the Smithsonian performance objective to modernize the Institution's information technology (IT) systems, and supports the Institutions effort to provide support and monitoring when an employee is injured and unable to return to work.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2005	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	OFEO

5.3.5 NFC Payroll/Personnel System

Line of Business	Sub-function
Human Resources Management (403)	Benefits Management (254)
	Compensation Management (253)

a. Description

Since 1987 the Smithsonian has contracted with the National Finance Center (NFC) of U.S. Department of Agriculture for payroll and personnel services in a transaction-based system that maintains current and historical employee data. OHR staff enters personnel actions; Office of the Comptroller (OC) staff enters payroll documents and timecards.Beginning in FY 2005, the NFC Front End Systems Interface (FESI) is used to automatically transmit actions completed in the ERP HR system to the NFC Payroll/Personnel system. The interface is also used to update the ERP HRMS database with auto actions generated by NFC systems.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Integrate HRMS with FESI	10/2004		12/2004
Integrate Time and Labor with NFC	10/2004		09/2007
Upgrad to new FESI interface for OPM requested database changes at NFC	10/2008		11/2008

c. Benefits

NFC is one of the recommended federal payroll providers. Integration of systems supports the Smithsonian performance objective to modernize the Institution's information technology (IT).

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2005	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	• OHR	• OC

5.3.6 Electronic Official Personnel File (eOPF)

Line of Business	Sub-function
Human Resources Management (403)	Employee Performance Management (255) Employee Relations (256)

The Office of Personnel Management initiated the Enterprise Human Resources Integration (EHRI) project. The EHRI project is one of 24 OMB-sponsored E-Government initiatives. One aspect of the project is to create an electronic personnel record for all Federal employees. The purpose of the electronic employee record is to provide a consolidated image and data view that digitally documents the employment actions and history of individuals employed by the Federal government – the employee's Official Personnel File. The electronic employee record is built on the re-creation of the paper personnel folder in a digitally imaged format as well as the going-forward collection of personnel actions from the agency human resource systems. The Smithsonian's use of e-OPF will accommodate both its federal and trust employees.

Another aspect is that eOPF will begin feeding the new Retirement Management System (RMS). Feeding newly retired employee information into RMS may require a scanner/software setup prior to going live with eOPF.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Establish eOPF Steering Committee	10/2008	10/2009	
Sign Agreement with OPM	02/2009	02/2010	
Go Live with eOPF	09/2009	09/2010	
Interface with the Retirement Management System (RMS)	09/2011	09/2011	

c. Benefits

The eOPF initiative supports the Smithsonian strategic goal to modernize Smithsonian management systems by bringing each of them to a level of quality and sophistication appropriate to an organization of the size and complexity of the Institution. The initiative supports the Smithsonian performance objective to modernize the Institution's information technology (IT) systems and to support e-government.

In addition, the Smithsonian's use of it will allow both federal and trust employee to securely access their electronic personnel file from either home or work. When an employee leaves an agency upon a transfer the electronic file will be transferred to the receiving agency streamlining the transfer process.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:	2010 (planned)	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	OHR SI-wide

5.3.7 MEARS

Line of Business	Sub-function
Human Resources Management (403)	Compensation Management (253)

a. Description

MEARS provides detailed personnel cost information and assists staff in preparing monthly budget projections. This database contains just over 1,750 current and historical personnel costing records for Trust and Federal employees in OFEO; and for NZP it contains 850 current and historical personnel costing records for Trust, Federal and FONZ employees. In addition MEARS allows NZP to maintain a personnel and position database for positions not eligible for inclusion in the Smithsonian's HRMS, specifically, FONZ personnel, research associates, interns, and other non-employee personnel that work at NZP and who are supported by NZP.

MEARS allows for the creation of tailored reports based on management needs for salary and benefits projections, as well as current expenditures. MEARS has been designed to interface with FARSIGHT data for programmatic monthly budgeting purposes.

b. Benefits

With MEARS OFEO managers can track essential management information for permanent Smithsonian personnel, and manage FTE slots and personnel actions. MEARS data provides further detail to the ERP system, which is not available at this time.

MEARS allows managers to track essential management information for both permanent SI personnel and affiliates, such as researchers, scholarly associates and interns. Tracking for both personnel and associates includes such data as wage and stipend funding sources, campus and department location, eligibility for benefits and housing, FTE slot management and personnel actions. This

tracking is essential to the daily management of OFEO personnel in all Smithsonian facilities; and NZP personnel and affiliates between the NZP's Rock Creek and Conservation Research Center locations, as well as those research partners in the field.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2004	
Enterprise Architecture:	 X	Target Architecture Candidate for Replacement
Units Supported:	• NZP	• OFEO

5.3.8 Other Human Resources Systems

The following systems support various HR-related functions for the Smithsonian and are not currently planned for replacement by the ERP Human Resources Management System:

- **Accu-Trax.** This system stores the assigned lektriever and drawer number location of every Official Personnel Folder (OPF) and uses bar coding to charge folders out of and back into the file room.

- **FRCalc.** Benefits staff uses this system to calculate an employee's estimated annuity based on age, service commitment date (SCD), salary history, and planned retirement date. This calculator is provided through a subscription to ESI (Economic Systems, Incorporated.

- **GLC Lookup.** To input accessions and position changes to the NFC requires city, county, state, and country codes assigned by GSA to duty station locations. For this requirement, OHR uses OPM's Duty Station Locator System accessible via the Web at http://apps.opm.gov/dsfls/index.cfm

- **Label Generator for AOs/Directors.** Input screens enable entry of name, location, organization code, MRC, phone, and administrative officer (AO) or Director designation. The outputs provide formatted label text by category in order of the alphabet, organization code, or organization name order. *This system will be retired once eOPF is implemented.*

- The **ACES/ATS** system supports applicant tracking primarily in OFEO with a handful of others and will be fully retired once all recruitment actions are processed through STARS. Specifically **ACES/ATS** maintains records to track applicants, grant veteran's preference points, score applicants, break ties, issue certificate of eligibles to selecting officials, and issue notices of rating to applicants.

5.4 Inventory Management

5.4.1 Warehouse Inventory Management System

Line of Business	Sub-function
Supply Chain Management (405)	Inventory Control (144)

The Office of Contracting and Personal Property Management uses a commercial software product, *Sage Pro Elevator E-Commerce solution,* to support warehouse supply inventory management to track supplies, receive supply requests, issue stocked supplies, and to issue receipts to Smithsonian units.

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2008	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	• OCon&PPM • SI-wide	

5.4.2 Surplus/Excess Property Management Asset System

Line of Business	Sub-function
Supply Chain Management (405)	Inventory Control (144)

a. Description
The Office of Contracting and Personal Property Management uses a commercially developed software product, Surplus/Excess Property Management Integrated System (SEPIS), to control and manage the disposal of surplus/excess personal property assets.

Additional system functionality will be added in FY 2009 to include: (1) provide the capability of all Smithsonian units to view available excess personal property for reuse; (2) a potential automated retirement of disposed assets from the Surplus/Excess Property Management Asset System (SEPIS) to the ERP Asset Management Module; (3) improved reporting; (4) completely automating the SI 707, Property Transaction Form for SI users; and (5) making mandatory data fields on the SI 707, Property Transaction Form required to meet Federal and Smithsonian personal property requirements.

b. Benefits

Automates the current manual processes for tracking and managing the disposal of surplus/excess personal property assets. Additionally, it automates the excess Personal Property form, SI 707, for all staff.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2008	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	OCon

5.5 Facilities & Safety Management

The "1995 Report of the Commission on the Future of the Smithsonian Institution" described the Institution as *the principal repository of our Nation's collective memory and the Nation's largest public cultural space*.

In addition to the museums that provide services to the public on the National Mall in Washington, the Smithsonian—the world's largest museum complex—also has facilities

that serve as workplaces for scientists, curators, researchers, and other employees; and provide storage for documents, artifacts, and specimens not on display. While the most visible are the 19 museums and galleries, and the National Zoological Park, the Institution also manages:

- An animal conservation and research center at Front Royal, Virginia.
- Aircraft and spacecraft display and restoration facilities at Suitland, MD.
- Centers for biological research, conservation, and education in Panama, at Linkport in Florida, and on the Chesapeake Bay.
- The Center for Astrophysics in Cambridge, MA with observatories on Mt. Hopkins in Arizona and Mauna Kea in Hawaii.

Altogether Smithsonian facilities consist of more than 700 buildings that have a total of more than 10 million square feet of owned space and 1.8 million square feet of leased space, as well as 19,000 acres of land. Many Smithsonian buildings, particularly those on the National Mall, are architectural and historical treasures—one-of-a-kind structures—that attract nearly 30 million visits each year. They endure wear and tear comparable to educational structures elsewhere and to heavily trafficked public facilities such as shopping centers.

In this space, the Smithsonian must ensure that more than 136.9 million of the country's most valued artifacts are maintained in perpetuity through preservation, research, and educational programs. As any householder knows, the key to preserving artifacts and assuring the safety of visitors is secure buildings that are structurally and environmentally sound.

The inter-connected challenges of maintaining and, indeed, of transforming, aging, architecturally complex, historically significant, and publicly accessible buildings, require that the Institution establish a holistic means for honoring its commitment to stewardship, not only of the artifacts in its collections, but also of the buildings in which they are housed and displayed.

Many older Smithsonian facilities contain hazardous building materials that were in widespread use at the time of original construction. Hazardous materials such as asbestos, lead-based paint, ozone depleting substances and PCB fluids must be catalogued and tracked for safety and remediation purposes. Locations of hazardous materials are of paramount importance to ensure appropriate containment methods are incorporated for personnel safety when renovations, major repairs and alterations are carried out. The Smithsonian Institution maintains records and surveys of these items, but without a centralized database and central point of tracking, these records are difficult to verify and keep current.

Long-term facilities planning and renewal efforts now underway at the Smithsonian depend heavily on robust information technology systems to predict facilities needs, plan and budget for them, and integrate principles of asset and portfolio management into their management.

5.5.1 Facilities Management System (FMS)

Line of Business	Sub-function
Administrative Management (401)	Facilities, Fleet & Equipment Management (119)

a. Description

To help manage the revitalization, repair, and maintenance of its facilities the Smithsonian has implemented a commercial facilities management software product— *Tririga (FacilityCenter)*. *Tririga 8i* is a web-based enterprise-wide integrated work management system (IWMS). It provides a single, integrated, and centralized solution for all facilities management including space and property management and work order management for facilities operations as well as security, safety, and maintenance processes.

The system requires the expenditure of approximately $12.2million in the FY 2009 to FY 2014 planning period, a relatively small amount when compared to annual maintenance needs at the Smithsonian of approximately $150 million and the expected investment during the planning period of nearly $1 billion to revitalize Institutional facilities.

In FY 2008, the Institution:

- Continued to input facilities assets; and develop job plans and maintenance schedules. OFEO now has approximately 10,000 assets in the system and has begun to associate job plans and schedules.
- Continued to update and maintain space information and associated floor plans using CAD integration.
- Implemented additional Federal Real Property enhancements.
- Completed the consolidation of the STRI and OPS work order management programs.
- Deployed self-service functionality at STRI.
- Continued the API integration with ERP HR for employee information. Implementation will be January 2009.
- Continued to collect and analyze the requirements for hazardous materials tracking. Work to incorporate hazardous materials tracking functionality will continue in FY2009.
- Completed the integration with Kronos Time and Labor (ERP HRMS). This integration allowd OFEO to continue to capture information on the amount of time spent working on specific tasks.

- Implemented the Crystal Enterprise Server application to facilitate easier and faster reporting.

- Successfully completed both the Disaster Recovery Testing at the Sungard facility in Philadelphia, PA; and the OCIO security audit and table top review of the FMS Disaster Recovery Plan.

- Incorporated enhancements for the OPS security system maintenance and locksmith maintenance.

- Began work to incorporate the OPS reimbursements in FacilityCenter.

- Began work to implement METR Inspection functionality.

In FY 2009 and FY 2010, OCIO will continue to consolidate redundant systems, provide training to users, perform software configuration, and enhance system reliability and availability.

OCIO plans to continue to expand the use of *Tririga* to assist OFEO in managing its operations including space, asset, and work order management. This includes continuing work with OFEO to : 1) upgrade the *Tririga* application platform to 9i, , 2) implement enhancements to the work management program; 3) consolidate OFEO reimbursements; 4) deploy an enterprise reporting tool; 5) integrate with ERP HR for shared employee information; 6) implement Hazardous Materials tracking; 7) implement METR inspections, 8) to upgrade GIS software and to implement appropriate security; 9) implement Asset / PM functionality for STRI ; 10) complete the handheld technology pilot; 11) interface with the Smithsonian Centralized "People" repository for people related information; 12) begin work to integrate BIM technology; 13) implement Smithsonian-wide Self-service Facilities and Special Event process to replace the SI Form 23 process and to facilitate the real time processing of service requests; 14) integrate with the Building Automation System; and 15) integrate FMS with the Energy CAP utility system data.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Deploy ERP purchasing interface	10/2002		10/2002
Consolidate OFEO & NZP facility management systems	07/2003		01/2003
Implement project management software	12/2001		04/2003
Develop AIS security plan	07/2003		05/2003
Deploy *Get.Facility* module	03/2003		10/2003
Deploy facilities management intranet	12/2001		12/2001
Decision on *Tririga* software	08/2003		02/2004

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Upgrade to *Tririga 8i*	06/2004		03/2005
Implement risk management pilot	03/2005		03/2005
Upgrade *Tririga 8i* platform	10/2007		01/2008
Consolidate redundant systems: OPS MIS Reimbursement migration to FMS	10/2006	03/2009	
Deploy an interim enterprise reporting solution (Phase 1)	03/2008		06/2008
Deploy alternative interim enterprise reporting solutions (Phase 2)	01/2010		
ERP/FMS integration: HR	10/2007		12/2008
ERP/FMS integration: Time & Labor	10/2007		11/2008
GIS: Mall floor plans, geospatial integration with FMS	06/2002		06/2008
Deploy Asset Management functionality	06/2008		12/2008
Implement Asset Management in each OFEO Zone	12/2009		
GIS: Geospatial integration with FMS Assets	12/2009		
Implement hazardous materials functionality in FMS	09/2008	06/2009	
GIS: Geospatial integration with FMS Hazardous Materials	03/2010		
Handheld device pilot	10/2007	06/2009	
Upgrade to *Tririga* 9i	01/2009		01/2009
Interface with “People” data repository	10/2009		
GIS: Geospatial integration with FMS People	09/2010		
Expand Self-Service Request Module	03/2010		
Implement move management module	04/2010		
Implement key & lock module	06/2010		
Deploy *Tririga* handheld device technology	12/2002	06/2010	
Implement data warehousing	10/2007	09/2010	
Energy system integration	10/2007	09/2010	
Integrate Building Automation System (BAS) & FMS	12/2004	03/2010	
Integrate BIM technology with FMS	09/2010	09/2010	
Disaster Management System integration with Facility Center	10/2007	09/2010	
Implement reserve management	09/2011		
MSDS Finder integration (hazardous materials)	10/2007	09/2009	

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Implement Smart Chip technology	03/2010	03/2012	
Data integration with 3-D design, analytical, & simulation technology tools	06/2010	06/2012	
ERP/FMS integration: Assets	10/2008	09/2012	
FMS/*Medgate* integration	10/2008	09/2012	

c. Benefits

Full implementation of the proposed FMS offers a solution for numerous facilities management activities at the Smithsonian and the benefits that follow.

- Provide a shared centralized facilities data repository thereby reducing the overall need for redundant data entry.
- Track, measure, and manage facilities space planning and operations such as space attributes including occupancy, utilization, and square footage. As well as, the management of space moves, adds, and changes.
- Access to record and tracking information on assets including acquisition costs, equipment components, maintenance history, maintenance costs, and equipment location.
- Perform reliability-centered maintenance inspection scheduling and recording as well as planned maintenance.
- Track and report on the location and disposition of embedded and disposable Hazardous Materials and providing safety coordinators with access to the most recent MSDS fact sheets.
- A common centralized system for work management operations and processing; inspection scheduling and recording; and resource scheduling and management. Includes providing accountability for work from the time a request is initiated through to its completion.
- Continuous improvement measures and benchmarks against a unit's own history, as well as accepted industry standards, such as those of the International Facility Managers Association (IFMA) or the Building Owners & Managers Association (BOMA).
- Dashboard reports that indicate where resources are being used, what types of activities (e.g., electrical, plumbing) are being performed, and indicators that highlight backlogged work.

- Graphical representations of location, people, assets, inventory, etc., that will provide managers with “at a glance” capability to visualize and discern information with regards to space utilization and related proximities.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	1998	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	OFEO

5.5.2 Fleet Management System

Line of Business	Sub-function
Administrative Management (401)	Facilities, Fleet, and Equipment Management (119)

a. Description

The Smithsonian Institution, Office of Facilities Engineering and Operations' (OFEO), Office of Facilities, Maintenance and Reliability (OFMR), manages approximately 500 vehicles as part of the Smithsonian Institution's fleet. To improve the tracking and management of fleet assets and fuel, the Smithsonian will implement the fleet management system *Fleetwave*. This system will allow detailed tracking of fleet assets and the attributes in addition to providing operations and maintenance activities such as generating work tickets and maintenance schedules, tracking fuel purchases and usage, and providing numerous reports.

The Smithsonian's fleet and equipment is located in dispersed geographic areas and supports diverse missions. Approximately 75% of the vehicles are positioned in the greater Washington DC area with over 300 vehicles maintained at the NZP Vehicle Maintenance shop. Another 18% are located in Panama, some 72 vehicles. The remaining 7% are positioned in New York (1 unit), Florida (7 units), Arizona/Massachusetts (14 units), and Hawaii (1 unit). Approximately 90% of the vehicles are purchased, with the remaining being leased.

In January 2006, a Vehicle Fleet Management Operations Requirements Analysis study was performed by Runzheimer International Ltd. on the Smithsonian's Fleet Management program. Several recommendations were made which included centralization of the fleet management program, updated and enforced policies and procedures, compliance with EPA Act, Clean Air Act and OMB, FAST reporting requirements, establishment of a vehicle replacement funding plan, and improvements in fleet and fuel management data tracking.

In October 2007, the Smithsonian began implementation of the Fleetwave software. The software was configured for the Smithsonian, training was performed and Phase I of the system went into operation in March 2008. Phase II work will include an interface for fuel management.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Requirements review and market analysis	09/2007		09/2007
Phase I – Fleet Management			
Product acquisition - *Fleetwave*	09/2007		09/2007
System design	01/2008		
Training	02/2008		
Operational (assets, maintenance schedules)	03/2008		03/2008
Phase II – Fuel Management	04/2009		

c. Benefits

A system that can provide a comprehensive inventory of all fleet and equipment assets will assist in the: development of vehicle replacement plans, tracking and controlling of costs and vehicle utilization, production of a fleet acquisition budget plan, and a myriad of other standard fleet management analyses.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2008	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	OFEO • SI-wide

5.5.3 Parking Management System

Line of Business	Sub-function
Administrative Management (401)	Facilities, Fleet, and Equipment Management (119)

a. Description

The Office of Protection Services (OPS) in the Office of Facilities Engineering and Operations (OFEO) is responsible for the Smithsonian parking facilities and the administration and operations of the parking program. OPS currently uses two systems to manage parking which were built with technologically obsolete FoxPro software and are increasingly difficult to operate, maintain, and enhance.

The Daily Parking System tracks the daily assignment of parking spaces at the National Air & Space Museum garage, and the collection of parking fees. It also produces a daily parking list and parking passes. The system provides information on staff parking history which includes the dates, payment status, and, staff whose requests cannot be accommodated because of nonpayment. There is also a cash flow report that lists the amount collected on a daily basis and a cash flow cumulative report.

The Monthly Parking System tracks: parking requests, parking assignments, carpool ridership, parking lot space availability and payment method for lots at Smithsonian facilities in the Washington, D.C. metropolitan area. Parking Requests are processed in the system and based on Institutionally-established criteria; each request is ranked based on a point system. The system produces a Point Assessment list ranking parking requests in descending order. Parking Spaces are then assigned based on primary and secondary parking lot criteria. The system produces a report on final parking assignments, parking notification letters, and parking permits.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Parking System (FoxPro) implementation			1994
Requirements Review & Marketing analysis			2005
Business Use Case development & Marketing Analysis	09/2009	09/2009	
Product acquisition	TBD		
Implementation	TBD		

c. Benefits

This project will modernize the existing Visual FoxPro 7 system. The objective is to provide a Web based, multi-tier Parking Management System that satisfies Smithsonian's existing and new requirements for accurately documenting and managing monthly parking assignments, daily visitor parking, and for processing and tracking payments information.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:	TBD	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	OFEO-OPS • SI-wide

5.5.4 NZP Chemical Applications

Line of Business	Sub-function
Administrative Management (401)	Security Management (121)

a. Description

NZP's Chemical Applications System is a web-based environmental safety source that allows NZP staff to verify appropriate applications for industrial chemicals. Reports offer information pertinent to the preservation of both human and animal life. Substances are listed by both their common and chemical names so that they can be easily retrieved. The reports, which can be generated by building, animal area, organization or substance name, specify information such as appropriate uses, health risks, emergency first aid instructions, and manufacturer safety data sheets.

In operation since 2003, the Chemical Applications System provides an efficient mechanism for chemical report submission and supports electronic notification for more timely approval. Reports are reviewed by many professionals including curators, veterinarians, pathologists, environmental safety engineers and the Smithsonian Industrial Hygienist before being released. Approximately 2900 chemical reports are in existence and are made available indefinitely. The system also makes it possible to record timely and consistent modifications to these reports to reflect ongoing policy changes and new research data.

b. Benefits

Chemicals and substances may be benign to one species and toxic to another. Even common household substances, such as sodium chloride, may impose a serious threat to some species. This application provides a quick reference source of known and potential dangers to humans and animals. Chemicals used in park and exhibit maintenance may pose an indirect hazard to an enclosed animal. Review of all chemicals as related to exhibits near their use is an additional safety measure.

The application supports electronic notification of pending review items and a web-based review interface. Use of this electronic system has decreased the approval time of reports across departments dramatically--and in the most urgent cases approval can be made within hours or days instead of weeks or months.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2003	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	NZP

5.6 Security Management

The Office of Protection Services (OPS) provides protection and security services and operates programs for security management and criminal investigations at the Smithsonian Institution facilities on and near the National Mall in Washington DC, New York City, and Panama.

5.6.1 Management Information System: Office of Protection Services (OPS)

Line of Business	Sub-function
Administrative Management (401)	Security Management (121)

The OPS MIS is an integrated set of database applications used for in-house management of OPS assets, resources, and responsibilities including personnel management, and supplies and equipment accountability.

Over the next several years, some of this system's functionality will be replaced by comparable functionality, as appropriate, with the ERP HRMS, ERP Financials, and FMS modules. The following existing systems require replacement: Lost and Found Tracking System, and Unit Security Logs.

Funding Status (FY09):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:		*2010 (planned)*
Enterprise Architecture:		Target Architecture
	X	Candidate for Replacement
Units Supported:	•	OFEO-OPS

5.6.2 Security Management System: Identity Management System (IDMS)

Line of Business	Sub-function
Administrative Management (401)	Security Management (121)

a. Description

The Office of Protection Services (OPS) uses a series of separate but linked applications and sub-systems, to manage access, intrusion detection, and CCTV throughout the Institution's facilities. The IDMS is used to issue and manage Smithsonian identification cards to staff, contractors, and volunteers; track background investigations; store biometric data; and connect with OPM.

The photographic ID cards currently issued to staff are proximity cards that can be used to gain access to facilities that are controlled by proximity card readers or through physical inspection by security staff. Access is programmed at the facility and not through the IDMS.

The IDMS project will replace legacy manual systems used for background investigations, credential issuance systems, and identity proofing with an automated electronic enrollment and biometric data management system. The system will replace the current NACIS and support and track background investigations. The system will have links to OPM as well as online forms. The IDMS enables electronic capture and submission of biometric facial and fingerprint information for use in background checks and status tracking of NAC(I) adjudication.

Additional system capabilities may include interfaces with local facility security management system(s) (SMS) and data collection for use by Human Resources personnel management operations (with Peoplesoft HR). This project will include a modified business process to make the credential issuance process more secure. A standardized process of background investigations, credential issuance, and access control will streamline the process, improve security, and allow SI to meet the Homeland Security Presidential Directive 12 (HSPD-12) Federal mandate.

Homeland Security Presidential Directive (HSPD)–12 calls for a "secure and reliable form of identification issued by the Federal Government to its employees and contractors (including contractor employees)." The goals of this Personal Identification Verification (PIV) credential are defined as:

- Secure and reliable
- Issued based on sound criteria for verifying an individual
- Can be rapidly authenticated electronically
- Issued only by providers whose reliability has been established by an accredited process

Specifically, OPS plans to continue to provide operations and maintenance systems support to the Institution to:

- Implement the New IDMS system and replace existing Background Investigation and Credentialing systems
- Expand the IDMS System (fingerprinting and identity collection) to all appropriate remote sites;
- Expand the IDMS Enrollment System (fingerprinting and identity collection) to all remote sites;
- Interface the IDMS Enrollment System with the upgraded card access control system;
- Provide contractor services for IDMS security documentation, testing and SI Accreditation and Life Cycle Management Documentation;
- Provide ongoing licensing and maintenance support.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Implement revised administrative procedures complying with FIPS 201, Part 1 (PIV I)	10/2005		10/2008
Implement new IDMS and document & fingerprint scanning systems at all remote locations	06/2006	03/2009	
Interface with Peoplesoft HR systems	10/2006	10/2009	

c. Benefits

The IDMS initiative supports the Smithsonian strategic goal to modernize Smithsonian management systems and it supports HSPD-12. It will support the expanded e-government initiative by providing electronic validation of identity source documents, electronic scanning and storage of identity source documents, electronic storage of all paperwork, electronic scanning of fingerprint biometrics and transmittal to the OPM, and replacement of paper forms. The system will also be capable of producing a PIV-II compliant credential.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2009 (planned)	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	OPS

5.6.3 Disaster Management Planning System

Line of Business	Sub-function
Administrative Management (401)	Security Management (121)

a. Description

The Office of Protection Services (OPS) will use the Disaster Management Planning System to support disaster management efforts. Disaster management applies to major, usually catastrophic, events that deny access to normal operational systems or environments for an extended period of time. The enterprise level plan is the Institution's *Disaster Management Master Plan*. Most Smithsonian units must prepare an emergency management plan which will be invoked only when a major disaster occurs, defines procedures, roles, and responsibilities for conducting limited operations in the event of a disaster-related failure.

The Institution needs an automated system that will help Smithsonian units effectively manage the information required for disaster management unit plans. Key features of the proposed system are to: (1) allow units to develop consistent plans; (2) develop plans quickly and efficiently; (3) establish a master database of unit plans, attributes and procedures that can be maintained, accessed and updated easily; (4) provide access to critical information such as master floor plans, hazardous materials, staff locations and critical facilities equipment data that will assist the Institution in making logical and timely executive decisions; (6) minimize problems of out of date information, loss of information, and access to vital information in the event of a disaster and (7) create disaster plans for Smithsonian Critical Offices.

To increase efficiency in planning and development, the system will provide a method of compiling information into a master database. This system will interface with the Facilities Management System to obtain information on floor plans, hazardous materials, staff locations and facilities equipment data. These master databases will allow OPS to provide support to units during an emergency or disaster by providing ready access to relevant information that will aid in communicating with first responders, reallocating manpower to respond to an event, identifying assets at risk, etc. Improving disaster response can result in significant savings by reducing casualties, mitigating damage to assets/collections, shortening clean-up, reducing length of facility closures, and greatly assist in COOP operations.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Deploy a template that allows SI units and critical offices to document their unit security plans	12/2004		12/2004
Preliminary requirements & analysis	09/2009		
Deploy a Disaster Management Planning System (DMPS)	03/2009	03/2010	
Integrate the DMPS with FMS for shared floor plans, hazardous materials, and staff location information.	09/2009	09/2010	

c. Benefits

Improving disaster response can result in significant savings by reducing casualties, mitigating damage to assets/collections, shortening clean-up, reducing length of facility closures, greatly assist in COOP operations for all Smithsonian units, Critical Offices, and others.

Analyzing the information stored in this database will assist in identifying trends across units and/or identify conflicting information within various unit plans. For example, two units located in close proximity may choose the same location as a rendezvous point during an evacuation. This could cause confusion if both units are required to evacuate during the same event.

Database queries can be used to identify rendezvous points, locate conflicts and/or warn a particular unit if their rendezvous point has been determined to be unsafe.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:	2010 (planned)	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	• OFEO-OPS	• SI-wide

5.6.4 Security Incident Reporting System (SIRS)

Line of Business	Sub-function
Administrative Management (401)	Security Management (121)

a. Description

The Office of Protection Services (OPS) uses the Smithsonian Incident Reporting System (SIRS) to ensure that security incidents are responded to, documented, appropriately distributed, and reportable. SIRS provides each security unit with the ability to track the location, time, and a brief synopsis of security incidents that occur at the Smithsonian. It also tracks information for administrative activities that occur such as alarms statuses, key issuance, and completion of security rounds.

In FY 2007, the Institution identified requirements for the Security Incident Reporting System and completed a market analysis of commercial-off-the-shelf software. A solution was selected (*PPM2000 Perspective*) and purchased for implementation in 2008. The previous system, the Blotter Reports, was built with obsolete FoxPro technology which had become increasingly difficult for OPS to operate, maintain, and enhance.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Collect Requirements and Perform market Analysis	05/2007		05/2007
Prepare SDLC documents and present to technical review Board	08/2007		08/2007
Select and procure software and	09/2007		09/2007

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
hardware			
Implement application and perform training	06/2007	03/2008	04/2008
Implement Dispatch Log	12/2009		

c. Benefits

SIRS offers enterprise-wide incident, investigation, and case management. It enables OPS staff to enter and interactively manage all incidents and investigations from beginning to end using an enterprise solution. This includes a complete sign off and work flow process, and a high level of analytical analysis to optimize security planning.

SIRS is also used to generate both on-demand and custom reports that are distributed to various offices within the Smithsonian including Museum Directors and the General Counsel's office; and depending on the incident, reports may be provided to other agencies such as the National Park Service and the Department of Justice.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2009	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	OFEO-OPS

5.7 Document and Records Management

5.7.1 Enterprise Engineering Document Management System

Line of Business	Sub-function
Information & Technology Management (404)	Record Retention (141)

The Office of Engineering, Design, and Construction within the Office of Facilities, Engineering, and Operations (OFEO) manages all design and construction projects for the Smithsonian Institution. During FY 2005-2006 it made a tremendous effort to convert all completed project records from paper and microfilm to digital files. These digital files are now stored in the Engineering Document Management System (EDMS) database, Columbia Soft's *Document Locator.*

From FY 2007 – 2009, this office will change its business processes to drastically reduce the amount of project related paper documents generated and instead use the EDMS to support the project filing needs. Additionally, they plan to expand the use of the system to support other OFEO offices, reduce redundant paper file storage, and encourage intra-departmental cooperation.

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2006	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	OFEO

5.7.2 Legal Information System: Office of General Counsel

Line of Business	Sub-function
Controls & Oversight (301)	Corrective Action (091)

The Office of General Counsel (OGC) maintains a LAN (co-located in OCIO) to support its staff, computers, and OGC-LIS. OGC-LIS is a system internal to the office consisting of several commercial applications commonly found in small law offices. Chief among these are *Time Matters*, a law office management information system; *WordPerfect Legal Edition*, the standard used by the Department of Justice, the offices of U.S. Attorneys, and Federal District Courts; *Microsoft Word*; and the web-based, online *Lexis-Nexis* system for legal research.

Efficient law office management depends on the capacity to retrieve documents for modification and application to new matters. As the repository for the basic documents of all legal activities of the Institution, OGC plans to implement a high-speed scanning, searching, and database storage system to support searches by its staff that are conducted on a daily basis.

As an example, when a collections management issue arises, attorneys open old files to search for correspondence, agreements, legislation and subsequent amendments, trust documents, memoranda interpreting trust documents, related opinions of OGC, and policy statements of the Board of Regents. All of these documents must be in a central digital database to ensure ready access to them.

Funding Status (FY09):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:	1990s	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	OGC

5.7.3 NZP SYNAPSE

Line of Business	Sub-function
Information & Technology Management (404)	Record Retention (141)

a. Description

Of paramount importance to National Zoo is the welfare and care of the animal collection. SYNAPSE is a technically complex system for the storage and review of animal x-ray images at the NZP veterinary hospital. This system allows doctors to catalogue and index x-rays using software local to a personal computer and archived in an Oracle database. Specially designed monitors allow staff to view x-ray images from the SYNAPSE environment. A Fujifilm system used in both human hospitals and for veterinary purposes, SYNAPSE has been housed at NZP since 2003 and presently stores over 4200 films. These films are archived indefinitely and provide a critical consulting tool for difficult and unusual veterinary cases.

SYNAPSE is also capable of storing and retrieving other medical images, such as MRIs, sonograms and ultrasound images. NZP plans to expand this system to house and retrieve these image forms in the future.

b. Benefits

SYNAPSE provides a convenient mechanism for storage of both current and historical image data which can be easily retrieved and reviewed in treatment of complex cases. Because SYNAPSE supports electronic file storage, source film files can be electronically retrieved and forwarded to external veterinarians and doctors for immediate review and consultation.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2003	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	NZP

5.7.4 Electronic Records Management System (ERMS)

Line of Business	Sub-function
Information and Technology Management (404)	Record Retention (141)

a. Description

An Electronics Records Management System (ERMS) will enable the Institution to improve its governance and records management practices with regard to all electronic official business records across IT systems including email, file servers, databases, and digital asset management systems. It will also increase efficiencies while reducing costs by:

1. Storing a "single-instance" of electronic records,
2. Maintaining its official electronic records in a secure, controlled manner according to established record retention policies.
3. Facilitating the identification and retrieval of records from disparate and distributed systems by authorized employees,
4. Allowing the Smithsonian to respond faster to e-discovery inquiries while reducing retrieval costs as a direct result of the more precise record classification.

The ERMS will interface with several SI-wide systems, file servers, and unit-based systems to establish full records management compliance across the Institution enabling it to more closely comply with the Federal Electronics Records Management initiative, one of several E-Government initiatives established in the E-Government Act of 2002 (Public Law 107-347, Section 207(e).)

b. Benefits

Use of an ERMS by Smithsonian staff will improve Institution compliance with legal, regulatory, and OMB requirements for electronic records management and retention—including e-discovery. The ERMS will:

- Enable immediate placement of litigation holds on identified electronic official and business records, preventing deletion until all legal actions have run their full course.

- Reduce Smithsonian exposure to legal actions by enforcing full lifecycle management of electronic records, compliant record retention through precise record classification, and timely record destruction when the assigned retention periods expire.

The ERMS will improve staff productivity by reducing the effort necessary to accomplish recordkeeping of both electronic and paper-based records. It will reduce IT storage costs through the application of a single-instance storage strategy, leveraging the Smithsonian's enterprise storage architecture,

implemented across multiple SI systems including, but not limited to, file servers, email systems, and digital asset management systems.

c. Status @ a Glance

Funding Status (FY09):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:	TBD	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

5.8 Other Administration Systems

5.8.1 Correspondence Tracking System

Line of Business	Sub-function
Public Affairs (305)	Public Relations (111)

The Office of the Secretary, Office of the Under Secretary for Science, and the Office of Human Resources use the Correspondence Tracking System, *Intranet Quorum,* to track incoming mail; manage and store printed and hand-written material in electronic format enabling quick retrieval of records; scan letters into the system and associate them with other letters from the same correspondent, and create monthly reports. In addition the Office of the Under Secretary for Science and the Office of Human Resources employ the work flow module to track the distribution of correspondence to other offices in the Institution.

After three years have passed, information about the Secretary's correspondence is copied into a web-based system that permits public access to these original documents through the Smithsonian Institution Archives.

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	1997	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	• OS • OUSS	• OHR

5.8.2 eGov Travel Service (ETS)

Line of Business	Sub-function
Administrative Management (401)	Travel (122)

a. Description

The Smithsonian formed a team composed of travel management, financial, IT, contracting staff, and end-users to review the GSA E-Government Travel Service (ETS) and evaluate the service levels, performance, cost and benefits of migrating to ETS. Based on the results of this evaluation, the team selected the Northrop Grumman GovTrip system to replace the previously used commercial-off-the-shelf application, *TravelManager*.

The Smithsonian deployed the ETS in phases to allow the institution to incorporate any lessons learned during the deployment process and to reduce the burden on the limited resources of the deployment team. By the end of July 2007, the Smithsonian had migrated all units to GovTrip. The transition to ETS includes the use of the ETS vendor's travel agency services for most Smithsonian employees and a move away from staffing an internal travel agency capability. Some specific remote facilities have retained their local travel agency support.

The ETS deployment includes an interface with the PeopleSoft financial accounting system. Smithsonian is using a bi-directional interface via the ETS vendor's Enterprise Application Integration platform to reduce the number of errors associated with posting travel transactions and improve the speed and accuracy of travel payments to employees.

b. Benefits

The ETS provides the Smithsonian with a best-practices solution to support the travel process. The outsourced solution is provided on a fee for service basis, which greatly reduces the upfront investment necessary to field a solution and eliminates the need to manage upgrades and new versions of supporting software. The service provides Smithsonian with a self-service online booking capability which can greatly reduce the cost of buying travel services. Additionally, the service provides professional travel agent support 24 hours per day, 7 days per week.

The travel industry model is refined to the point where airline tickets, hotels, rental cars, etc. are a commodity purchase. Complicated travel scenarios that require more dedicated and specialized, but expensive support is the exception to the rule. The ETS allows Smithsonian to harness the buying power of the entire Government and adopt industry best-practices for travel management.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2007	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

5.8.3 Visit Count Management System (VCMS)

Line of Business	Sub-function
Administrative Management (401)	Facilities, Fleet & Equipment Management (119)
Planning & Resource Allocation (304)	Management Improvements (107)

a. Description

The Visit Count Management System is maintained and operated by the Office of Protection Services (OPS) in the Smithsonian's Office of Facilities Engineering Operations (OFEO). Its purpose is to record and report the number of visits to all Smithsonian museums and other facilities including the National Zoological Park by providing hourly, daily, weekly, and monthly visit counts.

The Smithsonian relies on the VCMS to publish statistical reports; perform trend analysis such as peak visit dates and times; and to judge the effectiveness of programs and exhibitions.

The first Smithsonian visit count computer-based system was a mainframe application implemented in 1968 which over time was replaced with DOS and Windows LAN-based solutions. The current VCMS replaced the Visual FoxPro 7 system in 2004 with a web-based multi-tier application. In addition to providing a more robust and reliable system, this web-based solution has reduced substantially the amount of desktop support needed to manage client workstations, and expanded the availability of reports and data queries throughout the Smithsonian.

b. Benefits

The VCMS provides:

- System-enforced data integrity and greater protection of principal data (door counts);
- Web-based user interface;
- User-friendly, Web-based reporting and visual query tools;
- An administrative functionality for monitoring, validating, and approving visitor count data;
- An audit trail for data entry and modifications.

c. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Implementation			1968
Software Enhancements (spanning multiple years)			2003
Modernization – requirements, design, development, implementation	07/2004		07/2004
Database upgrade	04/2008		04/2008
Software and reporting enhancements	06/2009	03/2010	

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2004	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	• OFEO • OPS	

5.8.4 Insurance Register System (IRS)

Line of Business	Sub-function
Internal Risk Management & Mitigation (302)	Contingency Planning (094)

The IRS is an Access-based system used by the Risk Management Division to manage the fine arts insurance program, which provides insurance coverage for Smithsonian collections items on loan to other organizations, as well as items on loan to the Institution. It maintains information on loans and generates certificates of insurance, as well as billing data for out-going loans.

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	1995	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	• OT	

5.8.5 Risk Management Contractor Insurance Program

Line of Business	Sub-function
Internal Risk Management & Migration (302)	Contingency Planning (094)

Initiated in 1999 to automate and streamline management, by Risk Management in the Office of the Treasurer, of purchasing general liability insurance for independent contractors.

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	1999	
Enterprise Architecture:	 X	Target Architecture Candidate for Replacement
Units Supported:	• OT	• SI-wide (data entry)

5.8.6 OIG Case Management System

Line of Business	Sub-function
Controls & Oversight (301)	Program Evaluation (092)

The Office of the Inspector General (OIG) Case Management System (CMS) is a system internal to the office based on the *Filemaker Pro* database management system. As the repository for the basic facts of each case, the system is used by investigators in the conduct of investigations, and by the Inspector General (IG) and Counsel to the IG to maintain oversight over the conduct of each investigation. The system allows the IG to efficiently determine the caseload of each investigator and the current status of each open case or complaint.

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	1990s	
Enterprise Architecture:		Target Architecture
	X	Candidate for Replacement
Units Supported:	•	OIG

CHAPTER 6
INFRASTRUCTURE INFORMATION TECHNOLOGY INITIATIVES

6.1 Overview

The Smithsonian operates most of its IT infrastructure on a centralized basis while some IT end-user support functions and application server operations are performed by its units. The Office of the Chief Information Officer (OCIO) is the central IT service organization at the Institution responsible for providing wide-area network, Internet 1 & 2 access, email, radio and telephone services across the Institution, Web hosting services for the Institution's websites, and limited local area network support. In addition, OCIO provides data center, help desk, and desktop services for selected units and applications. When Smithsonian units choose to operate or provide their staffs' with desktop and help desk services, they do so generally with systems interconnected through the Smithsonian Institution network (SInet). In some instances such as the collaborative partnership between the Smithsonian Astrophysical Observatory (SAO) and Harvard College Observatory, SAO operates its own substantial scientific computing infrastructure on the Harvard University campus with support from OCIO.

The Smithsonian Institution network (SInet) is a comprehensive, end-to-end data transmission facility linking file and print, email, and application servers; shared printers; and desktop and graphics workstations in more than 400 buildings in 46 locations in the United States and Panama. SInet provides network services and management to more than 6,000 users of office automation products, as well as access to administrative and program applications and databases throughout the Institution and to both the Internet and Internet II.

The Smithsonian plans to continue to standardize, modernize, and adequately secure its IT infrastructure incrementally through the planning period. In the future the IT infrastructure will add services, improve reliability, provide for growth supported by proven technology, integrate with the Internet Protocol (IP) communications architecture, and ultimately provide for an infrastructure to support voice, video, and data on a single platform.

The IT Infrastructure supports the following lines of business and sub-functions of the Federal Enterprise Architecture.

Line of Business	Sub-function
Information & Technology Management (404)	Lifecycle/Change Management (137) IT Infrastructure Maintenance (139) Information Systems Security (140) Information Sharing (262) System & Network Monitoring (263)
Administrative Management (401)	Help Desk Services (120)
Internal Risk Management & Mitigation (302)	Continuity of Operations (095) Service Recovery (096)

Program Area Snapshot: IT Infrastructure
LOB: Information & Technology Management (404)

Retired	Production (2009)	Planned (2010 to 2014)	
		Funded	Unfunded
• Novell ADS & GroupWise • Various search engines • 98 obsolete phone systems	*Target Architecture:* • Microsoft Active Directory & Exchange • Enterprise Mail System and Mobile Email Services • CITRIX • EMC Clariion & Centera Storage; EMC VTL • Secure Wireless • Centralized Video Conferencing • VoIP Telephony • Firewall; HIDS / HIPS • Web Content Management System • Google Search Engine *Candidate for Replacement:* • VPN	• Enterprise DAM • Common Wireless Access System • Sharepoint, internal	• EDAN • Enterprise Storage Expansion • Science Cyber-Infrastructure Storage • Automated Science Instrumentation • Sharepoint, external

Future Considerations / Performance Gaps

- An emerging need for virtualization of servers and applications and an increasing need for a compute cluster for running intense computational simulations and other programs.
- A growth in secure wireless applications following the limited rollout of the Institution's first production enterprise secure wireless network in 2008.
- As the Institution looks at pan-Institutional storage solutions for digitization of collections and research, there will be increasing demand for enterprise storage and backup solutions.
- With a multi-tiered storage environment and modernized back-up solutions, the Institution will need to address mirrored sites and developing and implementing trusted digital repository procedures.

6.2 Network Management Services

The Smithsonian continues to experience rapid growth in the use of networked desktop workstations and has become dependent on network services to support day-to-day operations. Currently, the Institution's network (SInet) provides more than 6,000 users at many sites with office automation products, data, and program applications, connecting all units of the Institution at 46 locations in the United States and Panama.

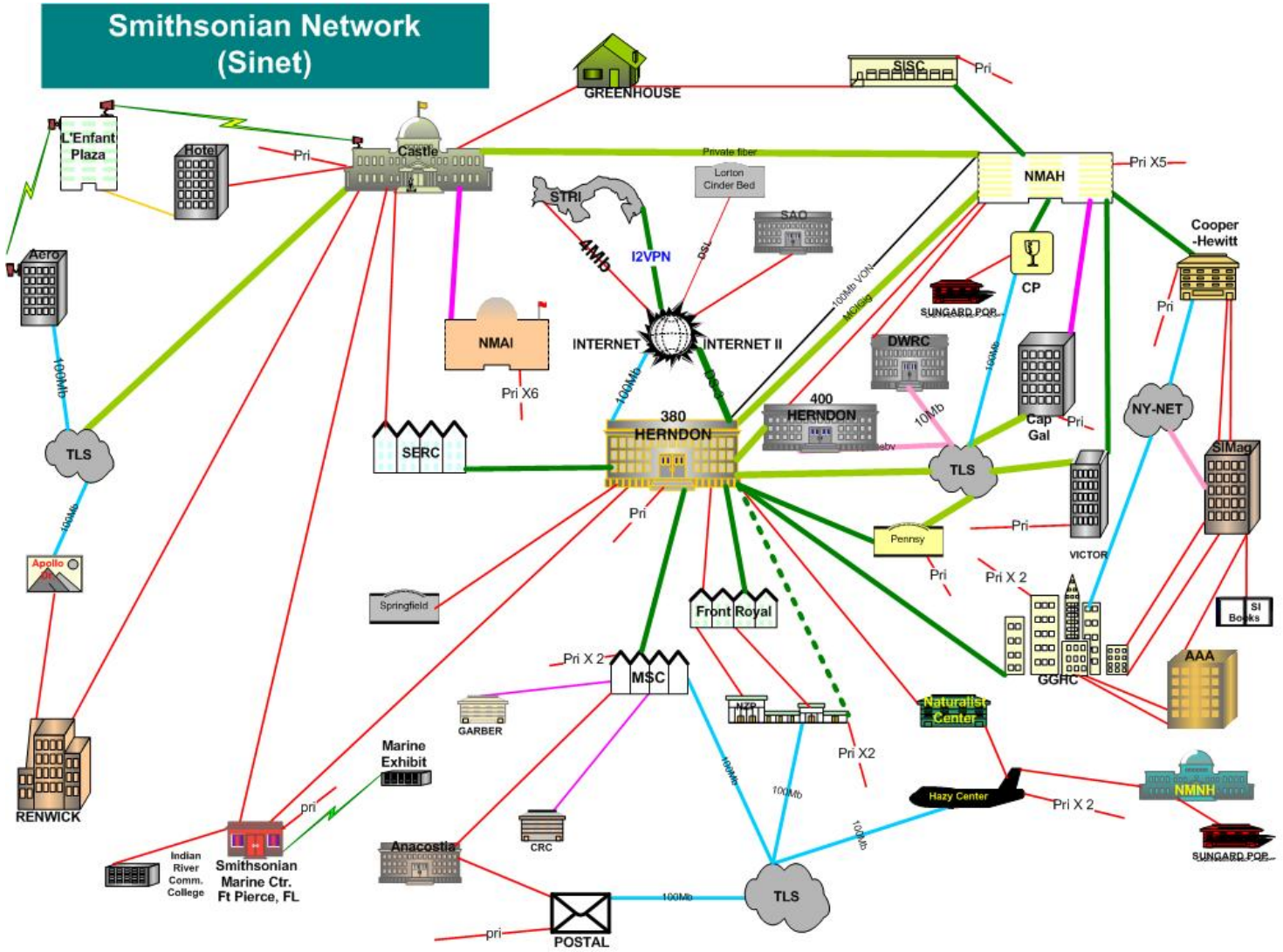
6.2.1 Network Operations, SInet

a. Description

The Smithsonian Institution Network (SInet), illustrated in the diagram on the next page, is the comprehensive, end-to-end data transmission facility that links desktop workstations, servers, services and shared printers throughout the Institution.

The network operations staff operates and maintains SInet with the primary objective of improving services so that its users have timely, reliable, and cost-effective access to automated systems when they need them. The staff performs preventive maintenance on all network infrastructure devices to ensure that configurations are correct and baselined and that hardware is operational. The Smithsonian operates a Network Operations Center (NOC) to monitor SInet operations to tell how well the network is performing in terms of availability to its customers. This is accomplished by generating activity reports on all system outages, real-time performance analysis (how the network is performing right now), and trend analysis (how the network is performing over longer periods of time). System and network monitoring tools allow network operations personnel to trouble-shoot problems quickly restore service or reroute communications. In many cases, outages can be prevented before they occur.

The Institution plans to continue to modernize the IT infrastructure, upgrading existing system and network monitoring tools, and acquiring additional tools to support IT infrastructure management services. Collectively, these products are an enterprise management system that consists of a suite of products and services and provides an automated and reliable solution for managing the operation of selected components and services of the IT infrastructure. Properly used, these tools will help ensure the availability, fault management, and automated operations of those parts of the infrastructure and will correlate, refine, synthesize, and report availability and fault data generated by them.



Smithsonian Institution Network (SInet) Diagram

Implementation of new IT systems, such as the Enterprise Resource Planning system, expanding the content of the Institution's collections information systems, and public access via the Internet to Smithsonian collections and knowledge, requires continuous enhancements to SInet to ensure customer satisfaction with network performance. Enhancements will continually be needed to address increasing expectations especially to communicate electronically via the Internet with colleagues and education and research partners, conduct research with external colleagues from remote locations, and to disseminate information to maximize visitation, membership, and revenue to the Institution.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Increase bandwidth to MSC	10/2001		05/2002
Complete 100 Mbps to desktop network access	12/2001		12/2001
Complete installation of gigabit Ethernet backbone switches	12/2001		03/2002
Increased the bandwidth of the SInet Internet connection to a DS3 with 45 Mbps of bandwidth	12/2001		11/2001
Provide Internet 2 connection	02/2002		03/2002
Increase SInet leased-line bandwidth to DS-3 to New York units	03/2002		05/2002
Increase SInet leased-line bandwidth to DS-3 to the MSC in Suitland, MD	04/2002		06/2002
Install alternate paths to Walter Reed Greenhouse, North Capitol & Renwick Gallery	06/2002		02/2002
Increase SInet leased-line bandwidth to DS-3 to NZP	06/2002		04/2002
Install redundant core switches for the Mall museums	10/2002		10/2002
Install alternate path for fiber optic cabling connecting the north and south sides of the Mall	07/2003		04/2004
Extend SInet to Udvar-Hazy Center at Dulles	09/2003		04/2003
Upgrade SInet backbone switches to support quality of service and VoIP	01/2003		01/2003
Extend SInet to Apollo art collections storage facility	07/2004		07/2004
Increase SInet leased-line bandwidth to DS-3 to the SERC in Edgewater, MD	07/2004		01/2005
Increase SInet leased-line bandwidth to 100 MB TLS to the NPM	10/2004		10/2004
Increase SInet leased-line bandwidth to 100 MB TLS to the NZP	12/2004		12/2004
Increase SInet leased-line bandwidth to 100 MB TLS to SI units in New York	01/2005		06/2006

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Extended SInet backbone switches to Herndon Data Center	09/2005		02/2006
Extend SInet to Capital Gallery to support move of employees from Arts & Industries Building	04/2006		04/2006
Extend SInet via 100 MB TLS to Crystal City to support move of employees from Victor Building	12/2006		12/2006
Extend SInet via DS3 to Crystal City to support move of employees from Victor Building	12/2006		03/2007
Increase SInet leased-line bandwidth to DS-3 at STRI	01/2007		03/2008
Move to GSA Networks Leased Line Contract for future increases of bandwidth at reduced costs	09/2008	02/2009	
NZP 2nd Point of Presence for SInet Connectivity	06/2008	02/2009	
Fiber optic cable run for BCI in STRI	08/2008		11/2008
Network router and switch upgrades for STRI to prepare for VOIP	06/2009		
DNS upgrade for IPV6 and DNSSec	02/2010		
FTP Redesign	05/2010		
ListServer Upgrade and Redesign	05/2010		

c. Benefits

SInet provides network services throughout the Smithsonian. Its continuing enhancement will provide its users the benefits that follow.

- **Greater bandwidth:** SInet's gigabit Ethernet backbone will allow adoption of new subsystems without concern about having to provide necessary bandwidth on a network segment basis. The increase in available bandwidth will result in faster network response times, which translates to greater productivity and effectiveness. Increasing bandwidth to DS-3 and 100 MB Transparent LAN Service (TLS) will provide for better response times and accommodate voice and data traffic to off-Mall locations.

- **Adoption of an industry-standard, network topology:** The gigabit Ethernet backbone allows the Smithsonian to readily upgrade the network to accommodate workload growth and improve customer service. Internet Protocol version 6 (IPv6) and DNS Security (DNSSec) will put the Smithsonian in line with government mandates and directions.

- **Faster access to data:** 100 MB to the desktop enables users to have faster access to internal and external databases.

- **Greater reliability:** It is essential that continuing enhancements are made in order to support user requirements; improve reliability, maintainability, and availability of network resources; and to achieve the level of operational integrity required to support the needs and expectations of the user community. Also important is the ability to provide the necessary level of security and enable the rapid infusion of new technology to meet growing workforce demands.

- **Improved accessibility:** Redundant connectivity provided throughout the network by alternate paths will ensure that it will continue to provide service despite line failures.

- **Network management:** Managing central and remotely distributed network components more effectively.

- **Network operations**: Improving maintenance and operation of high priority aspects of the heterogeneous complement of network equipment and software.

- **Automated reporting:** Increasing administrative productivity by automating many time-consuming routines.

- **Service commitment tracking:** Improving the IT planning process by ensuring that selected performance measures are tracked and reported at regular intervals.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

6.2.2 Network Server Administration

a. Description

The Smithsonian provides centralized services for directory, file and print, email, and office automation applications. In order to improve email, directory, and network operating system services, the Institution made the decision to migrate email services from Novell's GroupWise to Microsoft *Exchange/Outlook*; and directory, file and print services from Novell Directory Services (NDS) to Microsoft *Active Directory*, in a project which began back in March 2001. The migration was completed in October of 2007. Directory services for the Institution are now provided by OCIO through the use of Microsoft Active Directory and all staff are utilizing Microsoft Exchange / Outlook for email services. All file services have been migrated to Active Directory integrated Microsoft file server clusters, and all centrally controlled network printing is done through the use of Active Directory enabled Microsoft print servers.

Network server administration staff perform day-to-day operational management of the Institution's file and print, email, and directory servers and user accounts. It also operates and maintains external mail gateways. *Email services* allow Smithsonian staff to send and receive electronic mail among each other and the Internet community. It also allows the Institution to send general announcements, flyers, and organizational information and provides calendar functions so that employees can coordinate and schedule activities, meetings, and tasks.

Network server administration staff also perform network file and print services, troubleshoot and restore server operations, and manages, in coordination with the Customer Support Services Division, Microsoft *Systems Management Server (SMS)* (a desktop configuration management, remote workstation operation, and automated software distribution utility).

b. Benefits

Maintaining high system availability during normal work hours helps ensure that all desktop workstations, servers, networked printers, and other computer devices communicate with each other in proper fashion; and that employees have reliable email service and access to the automated systems needed for their jobs. Migrating to Microsoft network and email services has better positioned the Smithsonian to integrate with commercially available solutions such as BlackBerry handhelds, and Sharepoint; and at the same time simplifies administration overhead.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

6.2.3 Network Server Replacement Program

a. Description

Today OCIO manages and operates over 640 servers (509 Windows, 135 Solaris/Unix) and 690 network devices located in the OCIO data center and throughout Smithsonian facilities. These servers support both the data network and voice network and provide email, file and print, network management, backup and recovery, and many other services that go largely unnoticed until they are unavailable.

Application servers are deployed throughout the Smithsonian to support the IT infrastructure and unit applications. Many employees depend on these servers and the data that resides in them to perform their day-to-day work. The servers are used to support administrative and program applications. Reliable access to these application services requires a robust infrastructure with reasonably current devices.

The consolidation of unit servers in FY07 and FY08 into the Herndon Data Center greatly increased the number of servers that OCIO must plan and fund for routine replacement. As of the end of FY08, 160 unit applications servers were relocated to the Herndon Data Center, all of which will need to be upgraded or replaced within the planning period. Each year an audit is performed of the systems in the Herndon Data Center during which older servers are identified for replacement; where possible, applications are migrated to existing servers covered under an active maintenance contract; and, as a last resort due to financial limitations, new servers are acquired.

The Smithsonian needs to establish a periodic server replacement program (every 4 years for Windows-based servers, and every 5 years for Unix-based servers) to ensure that the Institution's servers are current and covered by a warranty thereby increasing the reliability of the servers. This approach reduces the cost that would be incurred by the units for which there is not a funded replacement program.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Tech note stating OCIO policies and procedures for Server Hardware Refresh	05/2008	06/2009	
FY 2008:			
Replace 26 servers	09/2008		
FY 2009:			
Replace servers	09/2009		
Retire/consolidate servers	09/2009		
Server Virtualization Pilot (XEN platform)	09/2009		

c. Benefits

Replacing server hardware on a regular schedule will provide for a stable environment and will increase reliability of critical systems such as email, file and print, and application services. Server downtime will be reduced by the fact that the servers are newer and covered under the manufacturer's warranty which guarantees a prompt response time in the event of a failure.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide (OCIO managed)

6.2.4 Enterprise Mail System

a. Description

The Enterprise Mail System (EMS) is the point of entry for all incoming mail to the Institution. Each message is subject to security checks, content inspection, and virus scanning. Only after a message passes these checks, is the message delivered to the internal Smithsonian mail server.

1. *Postini Software as a Service (SaaS) performs* security checks which includes, but is not limited to, checking for compliance with Internet email standards, checking the sender's email address, domain or IP address against patterns of known SPAM-like activities, performing "envelope checking" for popular freemail domains, checking for unallowable attachment types, and checking the content of the "subject" and message body for unallowable phrases.

2. *Postfix performs* security checks which includes, but is not limited to, checking for compliance with Internet email standards, checking if the sender's email address, domain or IP address is on either the locally maintained "blacklist" or the five widely used Real-time Blackhole Lists (RBL), performing "envelope checking" for popular freemail domains, checking for unallowable attachment types, and checking the content of the "subject" and message body for unallowable phrases.

3. *SpamAssassin* is a software utility that employs text analysis and wide-spectrum analysis of a message's content to score the likelihood that a message is SPAM. If a message reaches a certain score, it is determined to be SPAM and is rejected.

4. *Unix Virus Scan* (uvscan) scans all messages for viruses using virus definitions that are updated hourly. Virus-free messages are forwarded directly to internal mail servers. Whereas, messages infected with a virus are cleaned if possible; otherwise they are quarantined.

b. Benefits

The EMS increases staff efficiency and protects the integrity of Smithsonian email services and Smithsonian data files by:

- Striving to ensure the integrity of all inbound email messages by only accepting mail from trusted well-configured email servers;
- Decreasing SPAM;
- Eliminating inbound email-transmitted viruses.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2002	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

6.2.5 Remote Access to SInet

a. Description

Remote access allows employees to work from home or other approved remote locations using a connection to the Smithsonian network (SInet). A critical capability in the advent of an avian flu pandemic, or when operating under a natural disaster situation as that which occurred in June 2007 with the flooding in the Mall area that closed some of the Institution's buildings for up to a week.

Remote access at the Smithsonian consists of a heterogeneous environment of Citrix technology, virtual private network (VPN), and remote dial-in connectivity. Citrix is generally the preferred system to provide remote access to systems and files which are normally available from the user's desktop workstation connected directly to SInet.

In FY 2007, the Smithsonian's Office of the Chief Information Officer increased the number of concurrent Citrix licenses to support up to 500 concurrent remote access user connections; and to start the process of using Citrix as the primary means of connectivity for disaster purposes. This direction will reduce the need/use of VPN connectivity. VPN will only be primarily used for remote IPsec and high-level technical users.

As a result of this increased capacity, the Smithsonian needs to replace its aging Citrix servers. The existing Citrix server farm operates in a Citrix Presentation Server version 4.0 environment and in order to stay current the Smithsonian needs to upgrade to the latest version Citrix Xenapp 5.0. Currently support for Citrix is provided on a level-of-effort basis. The Smithsonian needs dedicated contractor support as staff increasingly rely on Citrix for remote access to the Smithsonian network and critical applications.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Procure New Server Hardware	10/2008	8/2009	
Configure New Hardware in test lab	10/2008	8/2009	
Configure Xenapp 5.0 in test lab	11/2008	9/2009	
Migration Plan	11/2008	9/2009	
Migrate Production Users	12/2008	10/2009	
Assess License Usage	12/2008	10/2009	

c. Benefits

Citrix offers an elegant and easy to use solution to the Smithsonian for remote access to critical IT resources. Replacing the server hardware will ensure that remote access to the Smithsonian network continues to be reliable and highly available. The warranty on the existing hardware is scheduled to expire in 2009 and replacing the systems with new systems which come with a 3 year warranty will ensure prompt service from the manufacturer in the event of a hardware failure.

Upgrading Citrix Presentation server to Xenapp 5.0 will put the Smithsonian Citrix farm on the most up-to-date version of the Citrix remote access solution. Staying current ensures that support staff will be able to get assistance from Citrix in the event of a problem or outage of the Citrix servers. There are also enhanced security features of Xenapp 5.0 that will be of benefit to the Smithsonian's efforts to secure the network.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

6.2.6 Enterprise Storage

a. Description

Enterprise Storage at the Smithsonian Institution is currently comprised of a number of large scale hardware platforms which provide the Institution with a high performance, reliable, and scalable infrastructure for data storage and retrieval.

A tiered storage model, following the recommendation of an Enterprise Storage Technical Working Group in 2006, has been implemented in the Smithsonian's data center.

- The first tier is online storage which consists of two high performance EMC Clariion CX3-80 SAN. *Online* data is generally web-based and accessed most frequently. Online data is the primary means of making the Smithsonian collections available to the public, scholarly research and educators The CX3-80s provide storage to mission critical applications such as email, database, and file services and utilizes fiber channel hard drives; and operates on fast 4 Gigabit-per-second fiber-channel based backbone and utilizes redundant architecture to provide high performance highly available storage.

- The second tier of storage is near-line or archival storage. *Near-line* data is accessed less frequently and would include data used by Smithsonian staff as they create and manage their respective pieces of the overall Smithsonian collection. At this level, data is stored on a hardware platform with a slower speed backbone and lower performance hard drives, delivering a slightly lower response time to the user. The Smithsonian provides near-line storage through the use of an EMC Centera. The Smithsonian initially used the Centera for archival of all Microsoft Exchange email. OCIO plans to expand its use by archiving file data and digital assets in FY2009..

- The third tier of storage is off-line storage. Data stored at this level is not readily accessible and is static. The Smithsonian uses both disk and tape media for offline storage. *Offline* data storage is primarily for backup/recovery/archive and is the insurance policy that protects the collections against catastrophic events. Access to offline data is very infrequent and certainly does not have the same time-sensitive nature of the first two categories. The disk based offline storage is provided by an EMC DL4100 virtual tape library (VTL). The Smithsonian also uses an ADIC i2000 tape library for off-line storage, as well as an IBM Magstar tape library and the Tivoli for collections digital assets. The VTL and the i2000 are part of the Enterprise Backup infrastructure at the Smithsonian that is detailed in section 6.2.7.

The current storage infrastructure provides a stable base for enterprise storage at the Smithsonian. The Smithsonian needs to better utilize the existing resources by implementing proper storage management policies and procedures. The migration to

Active Directory and Exchange included the migration of all unit operated file server storage to the central OCIO enterprise storage infrastructure. OCIO needs to establish capacity planning policies and practices in an attempt to control costs while still meeting the ever changing storage needs of the Institution.

In 2008 an enterprise online storage assessment was conducted which found that:

- 54% of files being stored are large than 25 Mbytes
- 62% of files have not been accessed in more than 1 year making them a logical candidate for archival storage
- 47% growth in storage used over the past two years
- 7% of the files stored are duplicate files

For more than two decades, the Smithsonian has been digitizing its collections, archives, library, and research information; and is now migrating legacy collections information systems to commercial Collections Information System (CIS) products. Just as a physical collection requires physical storage, the digitization of Smithsonian collections and collection objects born digital require electronic storage—and as the Smithsonian looks to extend its reach virtually the demands for enterprise storage will significantly increase.

Storage requirements can generally be grouped into three categories when dealing with digital collection objects:

1) Digital collection repository—online and near-line
2) Storage infrastructure in support of Web applications
3) Digital archival storage infrastructure.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Define the High Level Architecture	08/2006		08/2006
Consolidate & Upgrade NMNH SAN in Herndon Data Center	11/2006		11/2006
Install Centera Archiving System and 100 Terabytes of Archival Storage	02/2007		02/2007
Upgrade EMC Clariion CX600 SAN with EMC Clariion CX 380	02/2008		02/2008
Clariion File Assessment Study	05/2008		05/2008
New Centera, 82 TBytes, operational in test lab	10/2008		10/2008
Upgrade 2 EMC Clariion CS-500 into 1 CX-380	12/2008		12/2008
New Clariion CX4-80, 200 Tbytes operational	12/2008		12/2008

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Capacity Planning Tools Implemented	04/2009		
Tiered storage architecture solution for office automation files	07/2009		
Implement Enterprise Email Archiving Solution SI-wide	09/2009		
Expand storage	TBD		

c. Benefits

The centralization of enterprise data storage provides an overall cost savings to the Smithsonian through economies of scale. The systems employed by the Smithsonian provide high performance and high availability. Data is protected through the use of the offline storage tier. Specifically, an enterprise-wide approach to storage is essential to protect and safeguard the digital collection assets of the Institution. A fully funded enterprise storage solution will allow the Smithsonian to manage its existing assets more efficiently while adhering to IT standards and policies for data storage, backup and retention.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

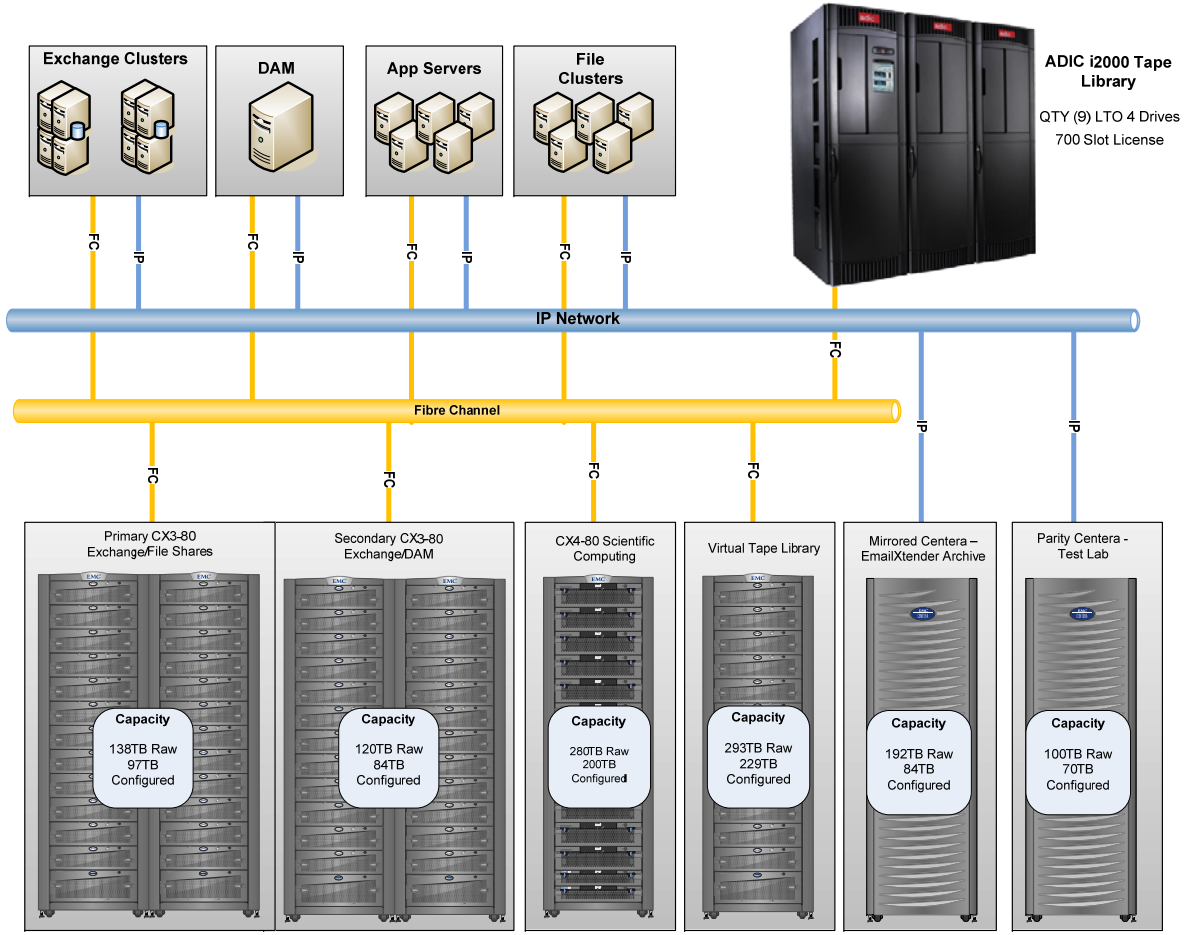


Figure 6.2 Current Enterprise Storage and Backup Architecture

6.2.7 Enterprise Backup System

a. Description

The data that is stored on the Enterprise Storage Infrastructure operated by OCIO must be protected from loss resulting from everything from data corruption to a natural disaster that destroys the data center. OCIO uses automated tape backup systems (ATB) to backup both enterprise storage and stand alone application servers. As the amount of storage increases, the tape backup system capacity must be increased proportionately in order to handle the increased demand.

In FY2007 OCIO completed a major redesign of the Smithsonian's enterprise backup system. A Virtual Tape Library (VTL) and Symantec Netbackup 6.0 were procured and added to the existing ADIC i2000 tape library as a major upgrade to the backup operations infrastructure. In FY 2008, the VTL was upgraded to increase the overall storage capacity in the unit; and the ADIC i2000 tape library received an upgrade of the internal tape drives utilizing media that has twice the capacity of the previous drives with increased performance thereby reducing the overall amount of time required to produce a full backup set of tapes. The ADIC i2000, originally placed into production back in FY 2003, will need to be replaced in FY 2011 as it approaches the end of its 8-year replacement life cycle. Upgraded drives purchased for this ADIC i2000 back in FY 2008, may be repurposed in the eventual replacement of this backup system.

In FY 2008, the majority of the Smithsonian's servers were relocated to the Smithsonian Data Center in Herndon with each of these servers added to the backup rotation further increasing the load on the enterprise backup system. While the upgrades performed in FY 2008 have improved the Institutions posture in regard to backup, the continually increasing storage demands will drive the needs for further improvements. An additional Virtual Tape Library will most certainly be needed in the future to accommodate growth.

A study conducted in FY 2008 revealed that 76% of the files system data can potentially be removed from the backup cycles, if the Institution implements a six month archival policy. This and other backup policy changes will be evaluated as alternative options to acquiring additional backup capacity, as warranted.

b. Benefits

The Enterprise backup system allows OCIO to recover data in the event of data loss quickly and reliably. Through the use of Symantec Netbackup all backup tasks are scheduled and managed with the Netbackup Enterprise console. Policies are configured to provide full backups monthly; and weekly incremental backups run daily. At the completion of each backup a copy of the backup is written to tape which is sent to offsite storage on a daily basis. There is always a full backup both onsite and offsite which allows for both quick recovery of lost or corrupt files on a daily basis using onsite media and disaster recovery using offsite media.

c. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

6.2.8 Network Cabling

a. Description

The Smithsonian requires a high performance, flexible, reliable network to support mission-critical, administrative, and office automation applications. Network cabling provides end-to-end physical connectivity and maintenance of the SInet cable plant, including operation and maintenance of all fiber and copper. Network cabling personnel maintain databases of all fiber allocated throughout the physical networks and, as required, cabling reconfigurations.

Network cabling personnel perform all cable installation, activation, and de-activation activities. To accomplish this, they must determine requirements and design, schedule, and provide post-installation support for all work orders. Personnel also receive urgent requests for service that must be met in less than 24 hours.

Network cabling activities are an ongoing level of effort that is performed in accordance with technical note IT-960-TN14, *Cabling Standards*.

b. Benefits

Network cabling is an IT infrastructure operational function that supports all Smithsonian units. Network cabling also establishes SInet capabilities in newly occupied space, deactivates unused ports within the infrastructure to lower costs, and adds ports as new devices are added to the network.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:		
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

6.2.9 Voice Network Services

Voice network services for all units include operating and maintaining: telephone lines and equipment, voice mail systems, blackberry and cellular services, trunked radio service access, microwave and satellite systems, teleconferencing, video-conferencing and toll-free services.

Telephone service includes local service recurring monthly charges, telephone system and set maintenance, directory service listings, and domestic long distance charges. Radio communication includes trunked radio systems for museum security and building maintenance, ship-to-shore communications for research vessels of the Smithsonian Environmental Research Center and the Smithsonian Tropical Research Institute, and microwave communications for the Whipple Observatory of the Smithsonian Astrophysical Observatory near Tucson, Arizona.

6.2.10 Voice over Internet Protocol (VoIP)

a. Description

In FY 2003, the Smithsonian began modernizing its telephone systems that had consisted of 98 mostly obsolete key telephone systems, 5 private branch exchanges, and about 10,000 telephone lines. The primary services vendor refused to maintain more than 70% of those telephones because they were too old. Equipment that failed was repaired on a best-effort basis that depended on the availability of parts and knowledgeable technicians. The Smithsonian telephone system was a combination of a leased, central-office-based (Centrex) system with infrastructure hardware and software located on telephone company premises and a VoIP system operational in 15 museums, 7 support centers, the Museum Support Center, the Archives of American Art, and the Cultural Resource Center.

Under the telephone modernization project, the Institution has replaced nearly all of the 98 telephone systems with Voice-over-Internet-Protocol (VoIP) technology. The exceptions being SERC, STRI, and NZP-CRC; and these systems will be replaced during the planning period as well. The telephone modernization project also includes the implementation of emergency response and emergency broadcast systems, as well as a telephone call accounting system.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Initiate project	04/2001		04/2001
Establish telecommunications baseline	07/2001		06/2001
Develop telecommunications master plan	10/2001		10/2001
Conduct 100-user VoIP pilot	09/2002		09/2002
Upgrade SInet backbone switches to accommodate quality of service and VoIP	01/2003		01/2003
Replace NASM telephone systems with VoIP telephone system	02/2003		02/2003
Install VoIP telephone system at NASM/Hazy Phase 1	03/2003		03/2003
Replace Freer-Sackler galleries telephone system with VoIP system	04/2003		06/2003
Replace Hirshhorn telephone system with VoIP system	05/2003		05/2003
Replace NMAH telephone systems with VoIP system	10/2003		10/2003
Install VoIP telephone system at NASM/Hazy Phase 2	10/2003		10/2003
Replace National Postal Museum telephone system with VoIP system	11/2003		11/2003
Install VoIP telephone system at NMAI Mall Museum/Phase 1	01/2004		01/2004
Replace Renwick Gallery & NMAfA telephone system with VoIP system	02/2004		01/2004
Install VoIP telephone system at NMAI Mall Museum/Phase 2	04/2004		08/2004
Implement Emergency Response System	05/2004		05/2004
Implement Emergency Broadcast System	06/2004		06/2004
Replace Cooper-Hewitt, NMAI Heye Center, AAA & SI Magazine telephone system with VoIP system	06/2004		12/2004
Install VoIP telephone system at NMAI Mall Museum/Phase 3	08/2004		08/2004
Install VoIP telephone system at Apollo Art Storage Facility	10/2004		10/2004

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Replace NMNH telephone systems with VoIP telephone system	12/2004		08/2004
Replace NMAI Cultural Resources Center telephone system with VoIP system	01/2005		01/2005
Replace NZP telephone systems with VoIP system	03/2005		03/2005
L'Enfant Plaza	04/2005		06/2005
NASM Garber Facility	04/2005		08/2005
North Capital Facility	05/2005		04/2005
Anacostia Museum & Herndon SBV	06/2005		06/2005
Walter Reed Greenhouse	07/2005		07/2005
Herndon Data Center	09/2005		03/2006
Aerospace Building	01/2006		02/2005
Patent Office Building/Phase 1	01/2006		05/2006
Castle	01/2006		10/2005
Capital Gallery	04/2006		05/2006
Patent Office Building/Phase 2	05/2006		09/2006
Crystal City	01/2007		05/2007
Victor Building	01/2007		07/2007
Fort Pierce SMS	11/2007		11/2007
Smithsonian Tropical Research Institute	07/2009		
National Zoo Conservation & Research Center	09/2009		
Smithsonian Environmental Research Center	05/2010		

c. Benefits

By modernizing the Institution's telephone system through the use of Voice over Internet Protocol (VoIP) telephony, the Smithsonian has reduced operational costs, substantially reduced time to perform telephone moves, adds, and changes, enhanced capability to respond to emergency situations, improved telephone call accounting, and improved availability and reliability.

The Institution is maintaining an overall minimum 99.99% availability for Call Manager and Voice Mail servers; and has reduced the cycle time for performing telephone moves and adds from 4 to 6 weeks to 5 work days or less, and telephone changes from 2 to 4 weeks to 1 work day. Through the emergency response system, the Office of Protective Services is able to quickly identify the location of emergency calls and track the response. Through the emergency broadcast system, Smithsonian management can generate voice messages quickly to all employees and volunteers in case of an emergency situation.

Modernizing the Institution's telephone system also:

- Improves customer service by locating the system on Smithsonian premises to eliminate dependency on vendors for system administration and day-to-day operational needs. System changes can be performed in real time by onsite staff, eliminating many current charges for these services. A centralized Help Desk that supports other information technology programs is being used, while remote user programming and trouble-shooting will reduce existing installation and repair intervals, saving time and money.

- Improves management of the system because it will be capable of providing reports to monitor and track system performance, analyze end-user data for problem management and resolution, and identify training needs.

- Improves financial management through the telephone call accounting system. This system will provide the necessary information to review and dispute, as needed, telephone bills.

- Improves security of the telephone infrastructure and attendant automated systems. The main security issue with any voice system is long distance fraud. Converging communications platforms will allow the voice system to take advantage of increased security safeguards to the overall network.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2003	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

6.2.11 Mobile Email Services (BlackBerry)

a. Description

Smithsonian staff may access their Smithsonian Exchange email through a *BlackBerry* device which is a wireless connectivity solution developed by Research In Motion, Inc. It uses a push-based technology that automatically delivers a user's email and other data to a handheld device that integrates a mobile phone, short messaging service (SMS), browser, and personal organizer applications.

BlackBerry may be used for either data only or a data-and-voice services. Implemented at the enterprise level, the *BlackBerry* server and associated application software integrates with the Smithsonian's enterprise Microsoft *Exchange* email system—acting as a gateway between user devices and email system resources—and becomes part of the Institution's unified messaging solution.

After an initial 50-user pilot in FY 2005, Blackberries were expanded to a full production system in FY 2006. As of the start of FY 2009, the Institution held over 700 Blackberry licenses.

b. Benefits

BlackBerrys support all units and benefit Smithsonian program areas by:

- Improving the capacity of Smithsonian managers and staff in responding to email inquiries;
- Improving the capacity of Smithsonian staff in responding to management direction.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2005	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

6.2.12 Centralized Video Conferencing Management

a. Description

The relocation of Smithsonian staff to less expensive real estate beginning in 2007 has increased the number of staff located off-the-Mall resulting in an increased dependence on video teleconferencing. Standalone video teleconferencing systems, in differing configurations, were installed at the Herndon Data Center (OCIO), Capital Gallery (OCIO, OSHEM, OHR), Crystal City (OCFO, OC, OCON, OSP, OT), Udvar-Hazy, NASM, NZP, CRC, GGHC, and STRI with support administered locally on an "other duties as assigned" basis by an individual point-of-contact (POC) who may or may not have any VTC experience. Additionally there were many more undocumented VTC units scattered throughout the Institution.

In 2008, OCIO implemented Cisco *MeetingPlace*–-a centrally managed server based application to host both internal and external online meetings that integrate audio, video and Web conferencing. Participants can share desktops, collaborate on documents, view presentations, share files and chat. Through this system, video conferences can be scheduled through a Web interface or directly from Microsoft Outlook. In addition, multi-point video conferencing of up to 24 participants is available through an imbedded video bridge in Cisco *MeetingPlace*.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Implement Cisco Unified Video Conferencing	03/2008		
Implement Cisco MeetingPlace Web Conferencing	03/2008		
Integrate Cisco MeetingPlace Scheduling with Microsoft Exchange	06/2008		06/2008
Integrate MeetingPlace Audio Server & Call Manager	06/2008		06/2008
Implement Decentralized Video, Web & Audio Administration & Scheduling	06/2008		06/2008
Pre-production beta test pilot	11/2008		11/2008
Production	11/2008		11/2008

c. Benefits

Centralized management of VTCs will lead to greater efficiencies and higher level of service as the Institution increases its reliance on video teleconferencing.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	OCIO • SI-wide

6.3 Enterprise Digital Asset Infrastructure Services

Enterprise Digital Asset Infrastructure Services is the framework for managing, protecting and sharing the national collection. By employing industry best practices in the development of our IT infrastructure and developing the tools that will allow our various IT assets to talk to each other, the Smithsonian will be well positioned to reach new audiences and make even more of our collection available to the public. At the same time this effort will help insure all of our assets are protected and preserved by making sure all of our digital assets are created, stored and backed up according to standard policies and procedures.

In building an enterprise digital asset infrastructure the Smithsonian must address the need to maintain not only the digital asset but also links to the metadata that describe the object. Effectively, there can be no preservation without metadata. Metadata provides the framework for digital asset preservation and thus forms an essential component of the virtual object. In addition, interoperable depends upon appropriate metadata in order to ensure readability over time.

The categories of metadata include descriptive, structural and administrative— with administrative further divided into its subcategories: technical, rights management, and digital provenance.

- *Descriptive metadata* is perhaps the most easily understandable in that it in effect contains the cataloging information: the content of the object, the names of the producers, and the subject.

- *Administrative metadata* includes:

    - *Access and property rights metadata* which enable us to govern how a file may be shared or repurposed.

    - *Technical metadata* which records characteristics of the original formats of the digital asset. Many times this data can be collected automatically at the point of creation of the digital asset.

    - *Digital provenance metadata,* often called process history or abbreviated as digiprov, describes in detail the entire preservation process from the analog or digital transfer and conversion, to the digital repository deposit. It documents the “who, what, where, and how” of all preservation activity from transfer through the creation of deliverables. This information is essential to managing files and migrating them automatically in years to come. Message digest information, sometimes referred to as a checksum, is also vital, and is used by programs to check for file errors that would indicate that refreshing or reversion is needed. .

- *Structural metadata* can define relationships and sequencing among a group of digital assets.

Failures are a factor in all systems. A digital asset's usability is dependent upon the reliability of the data and the systems that support that data. It is therefore vital that both the data and system integrity be monitored for failures and potential failures, and it is also vital that the digital preservation repository systems have sufficient redundancy to sustain failures while maintaining uninterrupted service and integrity of objects. Preservation copies must also be backed-up on separate device, in a physically separate location from the original files.

Digital file formats become obsolete. Software applications required for the use of those formats also become obsolete. User requirements change and may demand the richer feature sets of newer formats. It is vital that a preservation repository recognize both the threat of obsolescence and the opportunities provided by feature-rich file formats, and consult with collection owners to take appropriate action. Such actions might include either a format migration or the commitment to preserve an obsolete format and supporting application.

Digital mass storage systems form essential components of preservation and access programs. Digital mass storage offers the option of automated routines including migrating outdated formats forward in an automated fashion along with regular data-integrity checks of the contents.

6.3.1 Enterprise Digital Asset Management System (DAMS)

a. Description

An enterprise Digital Asset Management System (DAMS) will be a major component of the Smithsonian's digital infrastructure. It is essential to preserving, locating and sharing collections, science, library, and archive digital assets. A DAMS uses software to logically manage information about digital image, audio, and video assets. Digital assets include those that are digital in their original state ("born digital"), as well those that are created based on physical objects. The latter includes various physical photographic media, analog audio, analog video, and digital representations of physical objects held by the Smithsonian.

Digital asset management systems integrate directly with storage repositories—usually disks that contain the digital asset. The system provides a single logical view of many different digital assets in varying formats, regardless of source and physical location, which directly enables use of the same asset for multiple-purpose editing, publishing, web, and other applications and cost-effective security, backup, and recovery.

A digital asset management system is essential to meeting objectives for:

- Preservation and stewardship of objects and specimens.
- Organizing, classifying, and locating assets.
- Desktop and Internet access to content-rich collections, exhibitions, and research data.
- Delivery of digital assets in multiple formats.
- Public outreach and education and electronic commerce.
- Participation in external cultural heritage, library, and science initiatives.

The Smithsonian holds more than two million film negatives of events dating back to 1896 including a large collection of glass plate negatives, together with over 150 years of historical archive letters, journals, and illustrations. Roughly one-hundredth of one percent of its film in 20-year-old cold storage and of paper-based archives have been digitized and made available to the public.

Many records of photographs, archival materials, audio and video media are still kept on desktop software that no longer executes on modern machines. Media often is stored in individual desk drawers, USB flash drives, CDs, DVDs, and external hard drives. Little or no capture exists of the relationship between digital assets and collections, archives, research, and library data.

Failure to develop integrated, accessible digitized repositories threatens the ability of the Smithsonian to execute responsibilities for stewardship and preservation. Paper and film archives have only digitized repositories as a means of countering catastrophic accident, fire or flood loss, and media life-time limits.

Digital asset management and storage technologies have natural economies of scale and are highly dependent on long-term industry technology trends. They are related to the degree that they must be designed and implemented strategically.

In FY 2003, 21 projects sponsored by Smithsonian units identified current requirements for a digital asset management system; 13 projects indicated future needs. All of the projects share a need to preserve and access the image, audio, and video assets associated with the Institution's scientific research, collections, and library items, as well as its photographic and archival holdings. Using IRM Pool funding in FY 2004, the Smithsonian initiated a production, proof-of-concept digital asset management system project for four units: the National Museum of the American Indian, the National Museum of Natural History, the National Zoological Park, and the Center for Folklife & Cultural Heritage.

In FY2007 using end-of-year funds, the Smithsonian converted its 20 concurrent user licenses to server-based licenses for an enterprise environment. In FY 2008, efforts were focused on further expanding the initial DAMS into a production enterprise system. Specifically this included the evaluation of required system functionality, software and hardware configurations, database, metadata model analysis, supporting system infrastructure, support system resources and

procedures to meet the enterprise requirements of adding more SI units' digital assets to the DAMS.

The focus in FY 2009 will be to improve and implement additional hardware and software, and to revise the metadata model and asset security model to support a Smithsonian-wide enterprise DAMS. During the planning period, the DAMS should become a fully functional enterprise system to manage and protect the digital assets of the Institution. Its greatest limitation to its expansion will be resources—especially resources for enterprise storage on which it depends.

The proposed Smithsonian DAMS project will consist of a production enterprise system along with the required storage and hardware architecture to include backup, operational and disaster recovery and security integration. The SI DAMS architecture will also include the system development, testing, training, and off site recovery environments needed in support of an enterprise implementation.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Complete digital asset management requirements analysis & market survey	04/2002		11/2002
Select DAMS for pilot	09/2004		12/2004
Deploy DAMS to the four pilot units (NMAI, NMNH, NZP, and CFCH)	04/2005		06/2005
Upgrade DAMS from version 5.2 to version 6 for additional security controls	06/2005		06/2005
Upgrade DAMS from version 6.0 to version 6.5 for Artesia Folder	11/2006		11/2006
Upgrade DAM Project SAN	11/2006		11/2006
Implement backups via IBM Tivoli	11/2006		11/2006
Migrate NMAI film & video legacy databases to DAMS	05/2003	TBD	
Revise SI DAMS Metadata Model	03/2007	12/2009	
Migrate CFCH Legacy databases to DAMS	07/2007		
Migrate NZP ZooPix database to DAMS	08/2007	06/2010	
Select DAMS for Enterprise Use	03/2009		09/2007
Upgrade server Operating System and Oracle Database	01/2008		01/2008
Analysis of current system state (hardware, application configuration, usage & current unit needs)	09/2008		09/2008
Obtain DAMS support resources (contractor)	10/2008		11/2008
Develop, test and implement storage architecture (EMC Centera)	03/2009		

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Artesia 6.8 SP 2 Upgrade	03/2009		
Develop, test, and implement XMP fixes and Hot Folder ingest	12/2008	02/2009	
Production Sun Server Upgrades	02/2009	05/2009	
NMAI DAMS Production server consolidation	03/2009	06/2009	
Modifications to support EDAN Image Derivative Delivery Service (IDS)	03/2009		
NMNH eMU Integration	03/2009	TBD	
Pilot data and configuration clean-up	06/2009		
Metadata model/vocabulary redesign	12/2009	12/2009	
Develop High Level Architecture	06/2009	09/2009	
Develop Project Plan	09/2009	09/2009	
Deploy Enterprise DAMS for production use	09/2010	12/2009	
Artesia 7.x Upgrade Analysis	12/2009	12/2009	

c. Benefits

The Digital Asset Management system project is an IT infrastructure function that supports all units. It benefits Smithsonian program areas by:

- Enabling preservation and stewardship;
- Supporting public outreach, public education, and electronic commerce;
- Participating in external cultural heritage, library, and science initiatives.

d. Status @ a Glance

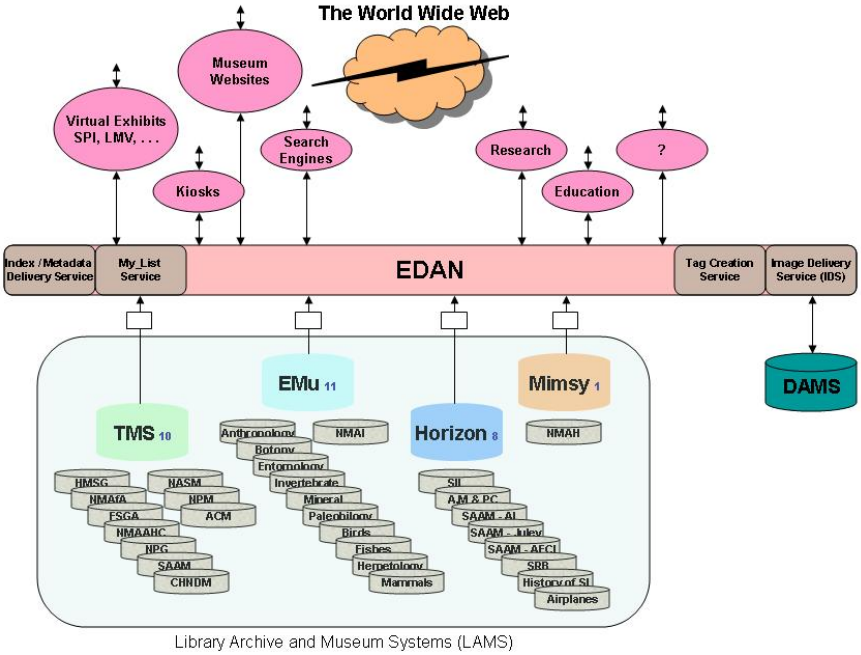
Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	2005 (pilot) *2009 (enterprise)*
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

6.3.2 Enterprise Digital Asset Net (EDAN)

a. Description

The Smithsonian currently lacks any way of providing the public, researchers, and staff with a unified view into its collections and associated digital assets. Under the Smithsonian's current collection data architecture, those searching for digital information and assets must know which Smithsonian unit holds the object and (often) in which collection system the object resides, regardless of whether the inquiry is being made by a scholar, the general public, a curator, or a scientist.

For Smithsonian staff preparing online exhibits, the current collections data architecture requires staff to copy the digital asset into yet another system or location in order to use the digital asset. This approach consumes limited storage space and more importantly it separates the digital asset from its primary system of record. Once this separation occurs, data synchronization and integrity issues arise and in many cases links to the metadata (e.g., description, copyright, restricted uses, and provenance information) are lost. Stewardship of Smithsonian collections is put at risk.



The goal of the EDAN project is to develop a centralized, reusable, metadata index and set of services so that Web applications can search, access, and display metadata and derivatives of digital assets held within the Smithsonian's major collections, library, and archive systems through one access / middle-layer.

The Smithsonian plans to implement EDAN in a phased manner as funds become available. In the first phase, currently under development, EDAN will:

1. Develop a metadata model that can be used by EDAN to index collection object record metadata pushed from major Smithsonian collection systems, and therefore searched and retrieved from one location.

2. Design, develop, test, and launch a:
   a. Collection data ingest process
   b. Metadata Delivery Service
   c. Image Delivery Service (IDS)
   d. Tag Creation Service

3. Develop and implement high-level storage architecture for the Smithsonian's Digital Asset Management System (DAMS) in support of the IDS component(s) of EDAN.

4. Retrieve images flagged for public access in SIRIS and the DAM using the Image Delivery Service.

5. Coordinate development with the Smithsonian Photography Initiative (SPI) as they re-architect their website to leverage the newly implemented EDAN Phase 1 services. Document client system interface processes and standards for future use by Smithsonian websites wishing to leverage EDAN metadata. SPI's re-built site will serve as a proof of concept and production example of EDAN in operation.

Desired services for future phases include an Audio Delivery Service, Video Delivery Service, My-List Creation service and the ability to manage unit approval flags through EDAN (rather than the underlying CIS). The current efforts to expand EDAN to incorporate collection object metadata from all major CISs and facilitate reuse and repurposing of data and assets without creating unnecessary duplication will also continue.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Phase 1:			
Project Management Plan and Requirements	12/2008		12/2008
TRB Requirements Review	12/2008		12/2008
Metadata Model	10/2008		10/2008
Phase 1: High Level Architecture and System Design	04/2009		
TRB System Design Review	04/2009		
EDAN System Development	09/2009		
Test Plan, Disaster Recovery Plan, Security Plan	09/2009		
Test	09/2009		
TRB Production Readiness Review	09/2009		
Deploy EDAN Phase 1 system	10/2009		
Phase 2	TBD		

b. Benefits

Once EDAN is implemented, Smithsonian collection data and digital assets (images, video, or sound) will be more accessible by Smithsonian staff, the general public and our external colleagues.

Sharing of the Nation's digital collections is fundamental to the Smithsonian's mission to increase and diffuse knowledge. Digital assets, unlike their primary physical object can easily be disseminated through the Internet; whereas a physical object can only reside in one location at any given moment, a digital asset may be included in multiple contexts via online exhibits and presentations all at the same time.

The EDAN initiative is an IT infrastructure function that supports all units. It benefits Smithsonian program areas by:

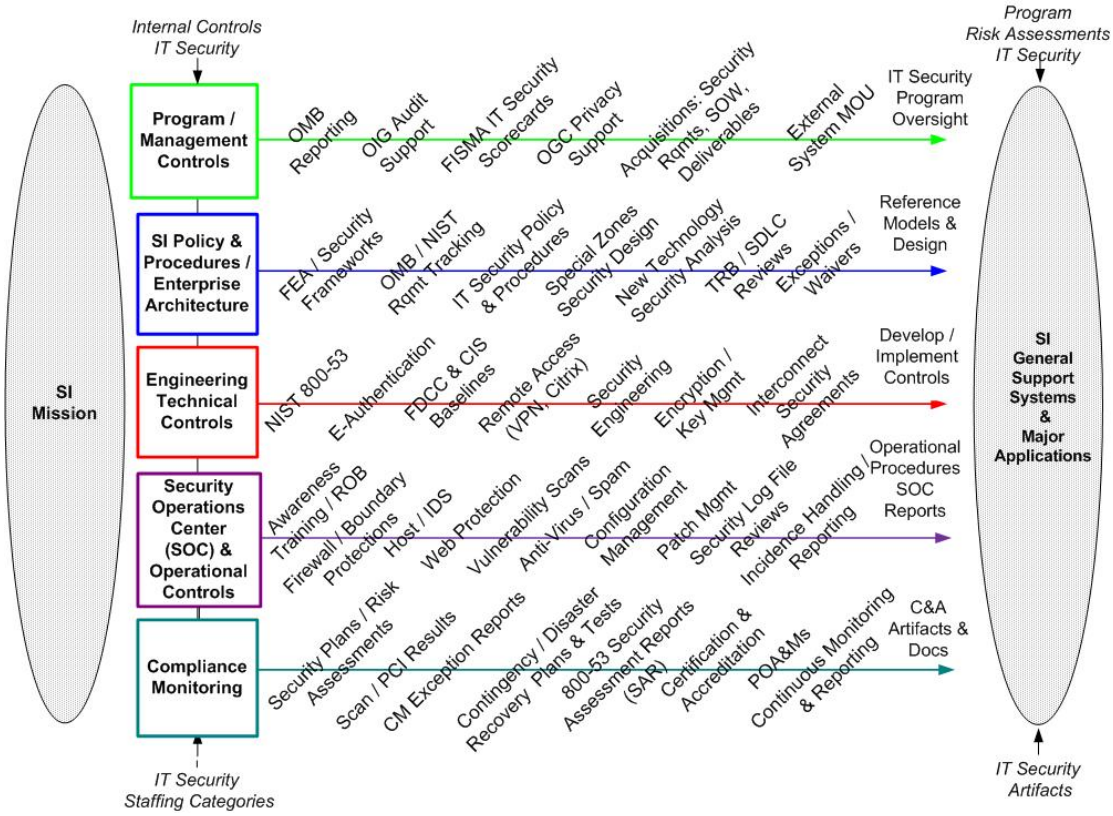
- Enabling the Smithsonian to perform its tasks of preservation and stewardship.
- Providing Internet access to content-rich collections, exhibitions, and research data to support public outreach.
- Participating in external cultural heritage and e-science initiatives.
- Enabling the remix and reuse of information in ways never before imagined as digital assets are shared across disciplines.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:		*2009 planned (Phase 1)*
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

6.4 Enterprise Security Infrastructure Services

The Smithsonian is committed to ensuring that its IT systems, applications and information technology infrastructure are secured. In order to protect common IT investments and to support Unit IT requirements, the Smithsonian must apply a broader more encompassing approach to managing IT security in the enterprise. As illustrated below, IT Security Enterprise Program identifies five (5) categories of internal IT Security Controls. These controls and descriptions of key activities have been identified in the following sections.



Smithsonian Vision - Balancing IT Security in the Enterprise

An enterprise program provides the Institution with increased assurance that the confidentiality, integrity and availability is optimized based on NIST recommended security control practices, Payment Card Industry (PCI) practices and common sense. The overall benefits of having an IT Security Enterprise Program are:

- Increased understanding by the units on IT security and privacy requirements
- Compliance is documented for common management, technical and operational controls
- IT security risks are more easily understood and managed based on security reporting and metrics.

As the Smithsonian increasingly relies on IT to support is mission, the possibility of a security breach affecting the SInrt infrastructure, a system or application increases. It is not just a case of embarrassment to the Institution. Failures in IT Security protections for confidentiality, integrity and availability can be costly to the repair and the loss of productivity a drain on already limited IT and mission resources.

6.4.1 Security Operations Center (SOC) & Operational Controls

The Smithsonian's Security Operations Center (SOC) provides timely protections against threats to the IT Infrastructure and Web portals, including support for managing firewalls and intrusion detection systems, SOC alerts and log file reviews. The OCIO has licensed a number of tools, both COTS and customized, along with software, hardware and appliance support for the following categories of security services:

1) Awareness, Training and Communications
2) Firewalls / Network Intrusion Detection (NIDS)
3) Host Intrusion Detection / Intrusion Prevention System (IDS / IPS)
4) Web Portal Protections
5) Vulnerability Assessments / Scanners
6) Anti-virus / Spam Detection
7) Configuration Management
8) Patch Management
9) Security Audit Trail Capture and Analysis
10) Incident Response / Forensic tools

Existing operational controls are primarily focused on perimeter defenses and end-point security. The short-term goal is to continue to manage the SOC and operational controls in a steady state of coverage (8 hours, 5 days a week).

The mid-range goal is to improve the robustness of these controls and to extend the SOC daily / weekend coverage. To support this goal, SOC staffing will need to be increased from the current coverage and/or the NOC staff trained to monitor security alerts and handle basic security services in emergency situations. A SOC Concept of Operations (CONOPS) will need to be developed in order to optimize staff, document tool reporting, and service requirements for operational security.

A long-range goal is to build a SOC reporting mechanism for the OCIO, the Undersecretaries and Unit IT Management Teams.

6.4.1.1 Information Security Awareness Training & Communications

a. Description

OCIO currently supports a number of tasks and activities which promote awareness of information security in the Institution and supports annual FISMA requirements for reporting in which measures of compliance are tracked as part of our annual FISMA Reporting

- *General, IT & Specialized Role-based IT Security Training*
  - Developing IT Computer Security Awareness Training (CSAT) content, managing delivery and tracking compliance for FISMA reporting.
  - Facilitating specialized training via e-gov GoLearn course reviews
  - Support CSAT updates for General Security / Privacy Training
  - Specialized training for system administrators

- *Communications*
  - Communicating to staff and end-user e-mail alerts & advisories on IT Security
  - Monthly support for working groups supporting Smithsonian Units: Computer Security Advisor Committee (CSAC), Certification & Accreditation Working Group (C&A WG), Payment Card Industry Working Group (PCI WG)

Measure	FY 2003 Baseline	Actual			FY 2009 Target
		FY 2006	FY 2007	FY 2008	
Smithsonian users who completed Computer Security Awareness Training (CSAT)	62%	95%	100%	98%	95%

b. Major Milestones

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Security training, FISMA reports, communications	08/2009		
Security training, FISMA reports, communications	08/2010		

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Security training, FISMA reports, communications	08/2011		
Security training, FISMA reports, communications	08/2012		
Support CSAT General Security / Privacy training updates (Team 23 Goal)	12/2012		
Security training, FISMA reports, communications	08/2013		

c. Benefits

Information security awareness training and communication increases support for an IT security culture with all levels of personnel supporting the Institution.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2003	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

6.4.1.2 Firewall / Boundary protections

a. Description

The Smithsonian completed a large number of improvements in the IT Infrastructure between 2003 and 2005, including significantly increased support for Firewalls (FW) and Network Intrusion Detection system (NIDs).

A firewall enforces rules on connections to Smithsonian systems or services between the Smithsonian and the internet and between different trust zones internal to the institution's infrastructure. Web application traffic on port 80 is continually reviewed, watching for large number of TCP connection requests, scan attempts, and other unusual activities which may be an attempt to break into a system, plant malicious code, deface a Smithsonian website or try to deny service availability.

The FY09 tasks are provisioned at a level that expects single points of failure since current staffing is not sufficient for constant monitoring of alerts and log reviews in conjunction with managing releases, patches, signatures and rule updates.

b. Major Milestones

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Firewall / NIDS consolidate/cleanup Nov 03-Jun 05	06/2005		06/2005
Review FW Rules to shutdown services	12/2005		11/2005
Complete Web application FW installations	05/2009		
Replace SE and STRI firewalls with new models	07/2009		
Perform annual FW reviews to maintain restrictions on ports, protocols and services	08/2009		
Install, configure and test FW vulnerability assessment tool	03/2010		
Complete installation of firewall reporting subsystem	09/2010		
Document FW compliance & exceptions	09/2011		
Document SOC Concept of Operations	09/2012		
Increased SOC FW / NIDS staff or NOC integration to eliminate coverage gaps	09/2013		

c. Benefits

Firewalls provide protection and detection services by continually blocking and screening sources and patterns for threatening network traffic.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2004	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

6.4.1.3 Intrusion Detection and Intrusion Prevention Systems (IDS / IPS)

a. Description

An Intrusion Detection System (IDS) provides security management system for servers and networks. The IDS gathers and analyzes information from various areas within a server to identify possible security breaches, which include both intrusions (attacks from outside the organization) and misuse (attacks from within the organization). IDS provide the following security services:

- Monitoring and analyzing user and system activities
- Assessing system and file integrity
- Recognizing patterns typical of attack
- Providing support for analysis of abnormal activity patterns
- Identifying user access control issues for further review
- Identifying suspicious connections
- Identifying any box performing internal scans

IDS run on individual host servers or network devices in order to monitor inbound and outbound packets from the device and alert the SOC when suspicious activity is detected.

Measure	FY 2003 Baseline	Actual			FY 2009 Target
		FY 2006	FY 2007	FY 2008	
Security incidents reported	100%	100%	100%	100%	100%
Security incidents tracked	100%	100%	100%	100%	100%

A Host-based Intrusion Prevention System (HIPS) monitors a specific resource, such as a desktop computer, and prevents malicious attacks from occurring. An IPS will take action to drop or deny any connection or communication that may threaten the system being protected. IPS also logs information regarding threats and intrusions that it detects.

An additional type of IDS is a Network Behavior Analysis (NBA) tool. This tool monitors normal Smithsonian network traffic usage and over time reports on anomalous behavior. Unlike the standard IDS this tool does not utilize signatures to identify potential problems.

IDS and IPS tools can overlap, but once deployed these tool must be continually updated in order to protect against common, frequently publicized types of attacks. While tool maintenance is time-consuming for the limited SOC staff, IDS / HIPS services are valuable to the integrity of the Institution's common IT infrastructure . Increased support for SAO and Smithsonian Enterprises (SE) is recommended should funding become available.

b. Major Milestones

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Define HIPS requirements	03/2004		03/2004
Conduct desktop HIPS pilot	09/2004		09/2004
Deploy desktop HIPS product on all new desktops	03/2005		11/2005
Evaluate commercial IDS products, define detailed IDS requirements	02/2005		02/2005
Initially deploy IDS in production environment	09/2005		03/2006
Identify additional host servers & devices	12/2005		07/2006
Deploy additional IDS in production environment	06/2006		10/2006
Identify additional host servers & devices	12/2006		12/2006
Deploy additional IDS in production environment	06/2007	10/2007	10/2007

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Deploy IPS / IDS in SAO and SE environments	09/2013		

c. Benefits

The IDS and IPS are essential IT infrastructure functions supporting all units. It benefits Smithsonian program areas by:

- Positively identifying all true attacks without falsely identifying non-attacks;
- Collecting forensic information on SInet activity;
- Triggering actions to protect computing and network resources;
- Identifying and correcting vulnerabilities;
- Supporting secure electronic commerce transactions initiated by customers;
- Improving the performance and reliability of Internet connections;
- Improving management and auditing of connections between the Smithsonian and the Internet.

d. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	2005
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

6.4.1.4 Web Protections

a. Description

The Smithsonian is planning a significant IT investment in order to support increased information distribution over the Web. This will involve the development of numerous Web applications and an increased number of Web portals. State of the art design and new programming paradigms are co-requisites for this development. The OCIO has also increased requirements that any new and updated Web applications and Web servers be scanned for vulnerabilities prior to deployment in production environments. Public facing Web servers are also being placed behind Web inspect firewalls which block common Website attacks from reaching the Smithsonian Web applications. In the long term a Web Application Security specialist should be added to support increased security in Web 2.0 architectural design and in application development reviews particularly as outsourcing is increased, as expected.

The Smithsonian staff is considered to be heavy internet users. On a typical day over 5000 unique Smithsonian workstations access the Internet. To continually protect Smithsonian resources from malicious internet Websites, OCIO has deployed a set of high performance servers and all Internet Web traffic is routed through these proxy servers. Proxy servers utilize a Web filtering system to help determine the appropriateness and security of the Website that the user is attempting to visit. Additionally all downloads from non-approved sites pass through filters which scan for virus signatures and block infected files from being downloaded. These Web protections for Smithsonian users browsing on the internet are in place at, and OCIO monitors existing tools and appliances. An improvement in SAO's Web proxy server and browsing protections is recommended as a mid-term goal.

b. Major Milestones

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Monitor existing Web protections, continue to review alerts, log files, and improve rules sets	09/2009		
Improve SAO Web proxy server support	09/2010		
Web Security – add IT Security Staff (1) FTE GS12/13	09/2011		
Support Web application SDLC reviews for security	09/2013		

c. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	2009
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

6.4.1.5 Vulnerability Scans

a. Description

One of the key activities in any IT Security program is the continual review and assessment of vulnerabilities based on network, system and application scans. The Smithsonian SOC has invested in several products to support vulnerability scanning for the enterprise. This allows configuration information to help identify high impact vulnerabilities based on; SANs top 20, Payment Card Industry (PCI) scans, and Web application scans for common programming vulnerabilities, etc. Continuing support for scans is needed in order to help system sponsors identify and prioritize weakness remediation and track for timely corrections.

b. Major Milestones

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Evaluate vulnerability assessment tools, Purchase and deploy in 2005	05/2005		06/2005
Perform regular vulnerability scanning	12/2005		11/2005
Work with major IT system sponsors to remediate SANS TOP 20 vulnerabilities	12/2006		12/2006
Upgrade tool / appliance to provide increased enterprise services	09/2007		09/2007
Perform quarterly Payment Card Industry (PCI) Scans and Open Heat tickets to fix failures	09/2008		09/2008
Configure external support for scanning Smithsonian DMZs	07/2009		

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Perform Top 20 scans for major systems annual assessment and accreditations and open POA&Ms for high Impact vulnerabilities not immediately fixed	09/2009		
Perform quarterly checks on Infrastructure as part of the Smithsonian boundary defenses	*09/2010*		

c. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	2005
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

6.4.1.6 Anti-Virus / Spam Protections & Detections

a. Description

The Smithsonian provides traditional end-point security for the Institution's desktops using a mature anti-virus product with enterprise level support for daily signature file updates. Our anti-virus product also provides a level of protection for Microsoft Exchange clients.

The majority of mail spam filtering / protection are being provided as an out-sourced contract. IT Security relies on desktop services to manage spam email protections.

b. Major Milestones

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Deploy SI Enterprise anti-virus at SAO	09/2009		
Incorporate SAO into SI Enterprise Anti-virus environment	09/2010		

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2004	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

6.4.1.7 Configuration Management (CM)

a. Description

The Smithsonian Configuration Management System uses software to create and store baseline operating system (OS) builds for Windows and Unix servers. It provides the ability to store and make available several versions of the operating systems to be used for the deployment. Server baselines are dependent on the server's function (i.e. Baseline image, Baseline with IIS, etc.) Each released version of the operating system is targeted for testing against the Smithsonian approved baseline standards. Selected systems have installed monitors to log configuration changes that occur within the server by using an agent installed on the server. The agent allows for compliance reporting based on the server's OS version, installed patches/hot fixes, etc.

b. Major Milestones

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Deploy Server security configuration management (CM) tool	11/2005		11/2005
Update policy to support the Center for Internet Security (CIS) baselines and document Smithsonian acceptable deviations	09/2009		
Begin support for selected systems configuration compliance reporting as part of accreditation	09/2010		
Increase major system configuration management compliance reporting as part of accreditation	09/2011		

c. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	2005
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

6.4.1.7 Patch Management

a. Description

The Smithsonian uses several Microsoft products for desktop patch management and flaw remediation. These tools provide timely support for workstation updates in our Windows environment. The IT Computer Security Staff relies on the desktop management services to direct this vital security function, and increased compliance for Federal Desktop Core Configuration (FDCC) is being targeted.

b. Major Milestones

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Continue to review SI acquired tool support for Federal Desktop Core Configuration (FDCC) and reporting capabilities	09/2009		

c. Status @ a Glance

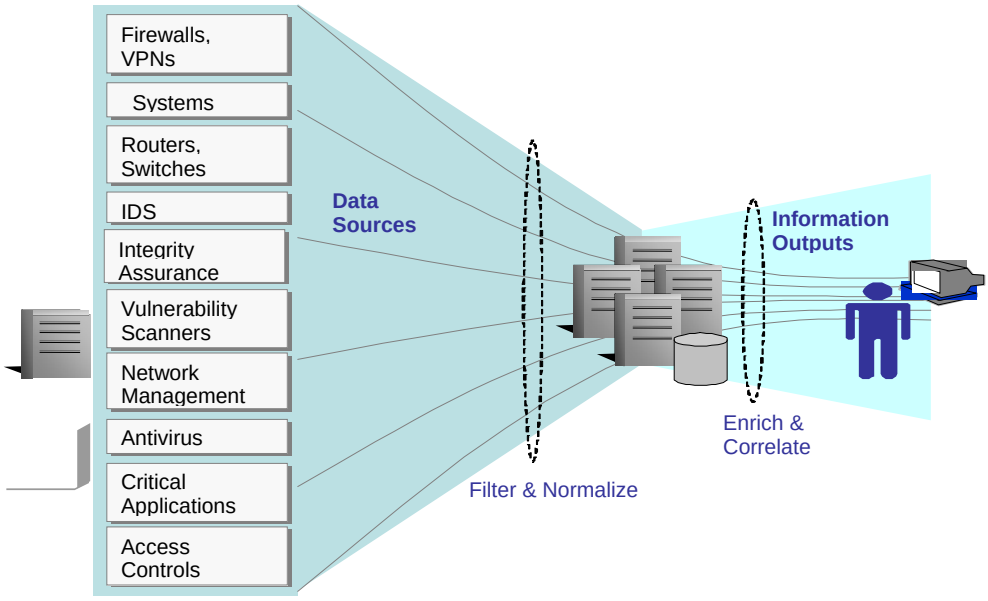
Funding Status (FY09):	X Fully Funded Partially Funded Not Funded
Production Date:	2004
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

6.4.1.9 Security Logs / Audit Trail Capture & Analysis (Security Information Management)

a. Description

The Smithsonian's IT computer security program has made a significant investment in IT security monitoring over the past five years. The basic types of tools and appliances are generally illustrated in the figure below. All of these tools generate large volumes of information and alarm messages on a daily basis. These alert records need to be monitored and the logs need to be retained so that if a compromise does occur, evidence of the attack is available to help identify exploits, address remediation, and identify attackers.

Over the past two years, several tools have been reviewed in order to allow individual security appliances and tool log files to be aggregated for collection and to allow possible relationships between events to be reviewed. As illustrated in the figure, the value of this type of tool is to aggregate reporting against all types of events and information from a variety of sources. Unfortunately the optimization of this type of tool is extremely time-consuming, and the storage and license cost are high. The Smithsonian is continuing to review how to efficiently and effectively collect and manage IT security information. Currently multiple tools are being supported.



b. Major Milestones

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
SOC SIM Management Collection tool reviews 2004 – 2006	09/2006		09/2006
Support OCIO system log collection pilot (splunk)	09/2009		
Improve Audit and Accountability by centralizing security log support *(SI Team 23 Goal - 3Q2013)*	06/2013		

c. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	2006
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

6.4.1.10 Incident Handling / Forensic Tools & Reporting

a. Description

As reported by the US-CERT, the federal government has seen a significant increase in the number of attacks directed at their IT systems over the past several years. While the number of successful attacks at the Smithsonian has been limited, our public Websites are increasingly being probed. The OCIO relies in part on the following sources to help us address situational awareness by identifying emerging threats, vectors, potential targets and possible impacts:

- Weekly US-CERT meetings
- Microsoft Security bulletins
- Common Vulnerability Enumeration lists
- Quarterly US-CERT reports

Measures of compliance are tracked by the OCIO as part of our annual FISMA Reporting:

Measure	FY 2003 Baseline	Actual			FY 2009 Target
		FY 2006	FY 2007	FY 2008	
Security incidents reported	100%	100%	100%	100%	100%
Security incidents tracked	100%	100%	100%	100%	100%

Increasing situational awareness and improved incident handling procedures are considered to be on-going goals. Increased staff training in incident handling is a longer range goal.

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Incident Handling, US-CERT & FISMA reporting	09/2009		
Incident Handling, US-CERT & FISMA reporting	09/2010		
Incident Handling, US-CERT & FISMA reporting	09/2011		

b. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2009	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

6. 4. 2 Compliance Monitoring / Certification & Accreditation

a. Description

The Smithsonian voluntarily supports OMB A-130 guidance on FISMA compliance requirements, even though most of our systems are low or moderate impact and the amount of Sensitive but Unclassified (SBU) information at the institution (as a .edu) is small compared to most federal / executive agencies.

Compliance monitoring includes support for FISMA Certification & Accreditation (C&A) and NIST 800-53A Security Assessments Reports (SAR), and provides tracking for weakness remediation using Plans of Actions and Milestones (POA&M).

Measures of compliance are tracked by the OCIO as part of our annual FISMA Reporting:

Measure	FY 2003 Baseline	Actual			FY 2009 Target
		FY 2006	FY 2007	FY 2008	
Major IT systems with a security plan	91.7%	100%	100%	100%	100%
Major IT systems that received full security accreditation	0%	100%	100%	100%	100%
Major IT systems that have a disaster recovery plan	8%	100%	100%	100%	100%
Major IT systems that have exercised the disaster recovery plan	8%	100%	100%	100%	100%

C&A support is provided for sixteen (16) major systems to ensure NIST SP 800-53 security controls are implemented, IT system sponsors understand control

weaknesses/vulnerabilities and Unit sponsors understand any potential risk to their mission. The OCIO works with the IT system sponsors to support FISMA artifacts and documentation requirements in the following areas:

1) System Security Plans and Risk Assessments. An on-going goal is to improve all major system security plans to provide information on control design and implementation.

2) Contingency / DR Plans and Tests. An on-going goal is to improve Contingency Plans (CP) and Disaster Recovery (DR) plans as well as to increase integration with the OCIO recovery plans, Office of Protective Services (OPS) Continuity of Operations Plan (COOP) and with telecommunications fail-over testing.

3) Security Assessment Reports (NIST SP800-53). An on-going goal is to improve security control testing, particularly for the major systems and any newly associated applications.

4) Certification and Accreditation (C&A). An on-going goal is to increase the value of C&A to IT system owners and to increase the security staff available to support ERP Systems and IT Infrastructure.

5) Continuous Monitoring. While the POA&M process was improved in FY09, additional improvements in continuous monitoring are being targeted for improved support over the next several years, including clearer requirements for reporting on account management, log reviews, and increased association with scan results and configuration management reporting.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Complete 3 C&A packages, 12 Annual Assessments	08/2008		08/2008
Improve System POA&M reporting	12/2008		12/2008
Improve SAR and e-authentication artifacts	08/2009		
Complete 12 C&A packages, 4 Annual Assessments	08/2009		
Improve C&A policy templates	12/2009		
Improve CP/DRP Plans and tests to increase integration with COOP. (Team 23 Goal 4Q09)	04/2010		
Complete C&A Packages and Annual Assessments	08/2010		

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Complete C&A Packages, Annual Assessments, POA&Ms	08/2011		
C&A Specialist – add IT Security Staff (1) FTE GS11/13 (Team 23 Goal)	01/2012		
Complete C&A packages, Annual Assessments	08/2012		
ERP Systems – add IT Security Staff (1) FTE GS12/13 (Team 23 Goal)	09/2012		
SINet Systems – add IT Security Staff (1) FTE GS12/13 (Team 23 Goal)	09/2012		
Improved System Continuous Monitoring & Reporting	09/2013		
SAO Systems – add IT Security Staff (1) FTE GS 12/13	12/2013		

c. Benefits

IT security certification and accreditation provides increased focus and implementation of NIST 800-53 security controls and control weakness remediation, which together results in a more consistently protected foundation for the Institution's infrastructure, systems, and applications. Improvements in continuous monitoring are expected based on requests to increase system security staff in 2012.

d. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	2009
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

6.4.3 Enterprise Architecture / IT Security Policies and Procedures

a. Description

1) **Federal Enterprise Architecture (FEA) Security Frameworks.** The FEA security framework is expected to increase the Smithsonian reporting requirements over the next five years, along with more Inter-agency security meetings and expected participation in programs such as DHS Trusted Interfaces Connections, Einstein, and agency level scans, etc.

2) **OMB / NIST Requirements Tracking.** OMB and NIST are consistently updating Federal IT security governance requirements and procedures by releasing memo's, directives, special publications and federal information processing (FIPS) standards. For any small agency it is a challenge to keep current in reviewing the guidance and determining applicability, value and projected implementation costs.

3) **Smithsonian IT Security Policy and Procedures.** The OCIO is expected to provide annual reviews and updates to Smithsonian IT security policies and procedures for the following documents:

   - Smithsonian Directives (SD)
   - IT Security Policies - Technical Smithsonian Guidance (TSG)
   - IT Security Procedures - Technical Notes (TN)
   - C&A templates and artifacts

   Annual updates for policy and procedures are expected in order to keep the Smithsonian up to date with OMB and NIST guidance.

4) **Special IT Security Zones.** The Smithsonian has architected special IT Security zones in order to satisfy mission needs while segregating user communities and reducing unnecessary security risks to the broader institution. Currently three zones are supported:

   - *Guest / Visitor Zone* establishes a segregated virtual network that allows access only to the internet and Smithsonian public facing servers. Access to SI production networks is not permitted. This zone is not designed for general public access or for Smithsonian staff but specifically for those visiting the Smithsonian on a temporary basis that need access through the Internet to their business or home computers. The Guest / Visitor Zone can support a CITRIX connection to SInet.

   - *Exhibit Zone* establishes a segregated virtual network that allows access only to the internet and Smithsonian public facing servers. The Exhibit zone was created to meet the needs of having Internet access as part of a museum exhibit in public space. The computer providing access to the Internet in a display or interactive kiosk has limited physical access, in order to prevent the public from accidentally or intentionally loading their

own content. Some facility exists for users to connect into the visitor zone and security monitoring devices exist to detect and prevent attacks. A limited set of ports are open outbound so that a limited number of services are offered by the zone – primarily Web based services.

- *Smithsonian Enterprises (SE)* has established an encrypted network for encapsulating commercial business traffic over the Smithsonian communications infrastructure.

Additional zones for e-commerce and partner collaboration are expected. Enterprise Architecture needs to continue to document IT Security design assumptions and review any controlled interface requests.

5) **Tracks impact of New Technologies on IT Security.** As support for electronic museums evolve, the ability to review and track new technologies and to understand any impacts to IT security and system vulnerabilities is needed, particularly for new technologies supporting, virtualization, WEB 2.0, XML security, Digital Data Rights, etc.

6) **Technical Review Boards (TRB) / Software Development Life Cycle (SDLC) Artifacts for IT Security.** The OCIO needs to ensure that IT systems developed in-house or out-sourced will support the Institution's life cycle management guidelines and support adequate IT security. Increased support for security reviews in the TRB is needed to verify security requirements are being addressed at the appropriate gates in the review cycle.

7) **Exceptions and Waivers.** All requests for IT security exceptions and waivers to policy and procedures should be formally reviewed and centrally tracked by the OCIO. At multiple points in the lifecycle of a major application or general support system an exception or waiver may be granted at the time of an IT acquisition, at a TRB/SDLC gate review, during certification or at a Change Control Board (CCB) review.

b. Major Milestones

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Create Exhibit Zone	07/2006		06/2007
Create Mall Wireless Guest/Visitor Zone	05/2008		06/2008
Begin tracking IT Security waivers & exceptions with system C&A packages	01/2009		01/2009
Provide annual updates to Smithsonian IT Security Policies and Procedures based on OMB/NIST guidance (Team 23 Goal)	02/2010		
Provide annual updates to Smithsonian IT	*02/2011*		

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Security Policies and Procedures			
Provide annual updates to Smithsonian IT Security Policies and Procedures	*02/2012*		
Provide annual updates to Smithsonian IT Security Policies and Procedures	*02/2013*		
Research impacts of new technologies on IT Security, e.g. Virtualization (Team 23 Goal)	*06/2013*		

c. Benefits

The Smithsonian has not been able to keep our policies and procedures current based on the rapid release of OMB and NIST Guidance. An increased integration of IT security with the Enterprise Architecture will allow for more timely updates to Policy and Procedures and keep the Institution more in line with federal IT security practices.

d. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	2006
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

6.4.4 Program / Management Controls

a. Description

The following program / management controls are being support by the OCIO. This is a level of effort function. The *IT Security Controls Manual*, TSG IT-930-02, establishes procedures and guidance for the IT security program at the Smithsonian including the assignment of program management responsibilities including direction of security operations and C&A activities on a daily basis.

1) **OMB FISMA Reporting Annually / Quarterly.** While the Institution is not subject to the E-Government Act of 2002 Title III Federal Information Systems Management Act (FISMA), the Institution currently reports annual and quarterly compliance based on OMB guidance and internally evaluates any deficiencies as best practices to secure its information.

2) **OIG Audit Support.** The Smithsonian Office of the Inspector General directs at least three annual audits documenting the institution compliance to FISMA. The OCIO IT Computer Security Director supports these audits and reporting activities. On average 30 recommendations are generated each year. Plans of Actions and Milestones are required to be developed and remediation tracked for OMB reporting, Smithsonian CIO and OPMB tracking.

3) **FISMA IT Security Performance Scorecards.** Starting in 3Q09 C&A system sponsors will be provided FISMA IT security performance scorecards to allow clearer tracking of expected FISMA requirements.

4) **OGC / IT Systems Privacy Support.** The OCIO supports the Office of General Counsel / Senior Agency Official for Privacy (SAOP) by reviewing Privacy Impact Assessments (PIAs), and Privacy System Control Safeguards, and for publishing PIA on the Smithsonian public website. The OCIO also assists the OGC in identifying Privacy Points of Contact (PPOCs) and identifying IT systems supporting sensitive Personally Identifiable Information (PII).

5) **System and Service Acquisitions (SA).** The OCIO goal is to increase IT Security requirements with acquisitions and to work with IT management to provide an early review of IT security resource allocations. Security also needs to support the major capital planning and investment reviews to ensure IT Security is included in contract language and vendor issued tasks, statements of work, memorandums of understandings, etc.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Provide PIA reviews and identify Unit Privacy Points of Contact	09/2008		09/2008
FISMA Reports and OIG Audit Support	10/2008		02/2008
FISMA Reports and OIG Audit Support	10/2009		
FISMA Reports and OIG Audit Support	*10/2010*		
Increase IT Security requirements in acquisitions and work with IT management to ensure sufficient resources are allocated to security. (Team 23 Goal)	*11/2010*		
FISMA Reports and OIG Audit Support	*10/2011*		
FISMA Reports and OIG Audit Support	*10/2012*		

c. Benefits

The FISMA program's benefits are to track and report on federally funded systems IT security practices across the institution.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2009	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

6.4.5 Security Engineering / Technical Controls

a. Description

The Smithsonian inventory of major systems is expected to support a large number of technical controls, and most of these controls require engineering support for their implementation to comply with standards for a secure implementation.

1) **NIST SP 800-53.** NIST 800-53 defines a number of technical controls including support for access control, audit and accountability, identification and authentication, and system communications controls, e.g. laptop encryption, VPNs, SSL, IPV6, DNS SEC, etc. The Smithsonian technical implementations should be reviewed and updated as necessary to comply with expected federal practices.
2) **E-authentication.** The support of an additional token for two-factor authentication should be provided for any moderate impact system that allows remote log-ins for system administrative functions. Currently RSA secure IDs are supported at the Smithsonian but deployment is limited.
3) **Remote Access (VPN, CITRIX).** The Smithsonian currently provides approximately 2000 people with remote access to IT resources. Requirements for these individuals to be provided remote access should be reviewed annually. IT Security reports on Virtual Private Network (VPN) and CITRIX support for remote terminal access are needed on a quarterly basis and logs should be reviewed on a regular basis.
4) **Wireless Infrastructure.** The Smithsonian wireless infrastructure was rapidly adopted by the museums as a key technology to facilitate exhibitions and collection management, using hand-held and interactive devices. In order to manage the risks of possible exploits in wireless environments user/device authentication and regular scanning is required. To reduce risk to the Institution, additional engineering work is required to support port level authentication and to integrate wireless alert reporting with the IT Security Operations Center. Current funding levels have limited deployments, but additional access points are being targeted and security controls need to be improved.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Phase 1: Wireless design wireless security infrastructure high-level architecture	09/2005		07/2007
Phase 2: Wireless design and test user/device port-level authentication method	09/2005		01/2008
Phase 2: Wireless design & develop enterprise user / device port-level authentication	09/2006	03/2008 *10/2010*	
Phase 3: Wireless deploy SI-wide port-level authentication	09/2006	12/2008 *02/2011*	

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Add Portable Computer Encryption for 500 laptops (Team 23 Goal)	12/2009		
Add Wireless – IT Security Staff (1) FTE GS 13/14 (Team 23 Goal)	*12/2012*		
Support two-factor authentication (password + token) for sys admin staff supporting remote access to SINet (Team 23 Goal)	*09/2012*		
Secure Name/Address Resolution Service (DNS-SEC) (Team 23 Goal)	*09/2012*		
Wireless Security Control Improvements (Team 23 Goal)	*06/2013*		
Phase 4: Wireless vulnerability scanning and Penetration Testing	*09/2013*		

c. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	2008
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

6.5 Enterprise Web Infrastructure Services

With nearly 173 million visitor sessions in FY 2008, websites provides the ideal opportunity to:

- Present a lively, coherent, unified Smithsonian to the public;
- Attract audiences to its facilities and help them plan visits;
- Extend the reach of the Institution across the Nation and around the world.

More than 150 projects within Smithsonian units share Web infrastructure requirements. These include: Web access to exhibitions, archives, collections, scientific research, educational outreach, community collaboration, and digital recording, photo, and video sales.

Despite a highly visible Web presence and high demand for using the web, centralized mechanisms do not exist for developing an over-arching online content strategy, producing and maintaining pan-Institutional content, and ensuring the accountability of content providers throughout the Smithsonian. Beginning in FY 2007, the Smithsonian kicked-off a pan-Institutional Web strategy to address these key issues.

In FY 2003, the Smithsonian implemented a robust, scalable, load balanced, centrally managed Web infrastructure supporting the unit websites. The Institution continues to enhance and maintain this Web infrastructure. As the demands placed on this infrastructure dramatically increase, the Web infrastructure continues to evolve to provide:

- Load-balanced web, Web application, and media servers that sit behind a content switch appliance to ensure fail-over and scalability;
- An internal staging and content management system environment separating content updates from the public infrastructure thereby providing improved security and the ability to reuse content;
- An enterprise level shared SQL database back-end providing dynamic content;
- An enterprise level shared Web reporting toolkit;
- An enterprise level shared search appliance.

6.5.1 Web Content Management System

a. Description

The Web Content Management system provides:

- The ability to create snap-shots of a public or internal website at any point in time, enabling the complete rollback of a site to earlier editions;
- Automatic versioning of individual site files, enabling the rollback to earlier versions of site components at an extremely granular level;
- Templating of Web pages enabling configuration control, and the ability for non-IT staff to edit page content directly via a Web browser and without special tools or training;
- Workflows allowing creation and enforcement of job routing, email reminders, and approval processes;
- Near complete extensibility allowing incorporation of custom coded scripts, functions, or executables.

b. Benefits

The Web infrastructure project, of which the Web application and content management system is a part, supports all museum, research, and administrative functions having public information access requirements. Smithsonian units and programs benefit by:

- Establishing Web application and content management technology;
- Reducing costs and improving reliability;
- Providing a solution that will improve management and productivity in posting to the Web public information for all functions.

c. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2004	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

6.5.2 Web Infrastructure Support

a. Description

OCIO Web Services Division (WSD) currently provides no-cost Web hosting services to Smithsonian museums and units for over 150 public websites and over 50 Intranet sites. The infrastructure required to support this has grown from a handful of servers to a technically complex, robust and scalable environment.

In FY 2005, the existing Web infrastructure was upgraded with new servers, storage, and tape backup systems in order to provide needed redundancy within the Smithsonian's Web infrastructure that had been lacking. In FY 2006, Google search appliances were added to support both internal and external clients and three sets of clustered SQL database servers were brought online.

WSD staff support multiple banks of Web server clusters; Web application server clusters; SQL database server clusters; audio and video streaming media servers; a Web statistics reporting infrastructure; a Web content management and site deployment infrastructure; a search infrastructure; a mail listserv infrastructure; an FTP infrastructure, all the sites, applications, and processes that run on these infrastructures, and SI's Prism Intranet.

In addition to these duties, staff assist in unit planning, testing, and deployment activities associated with new sites, provide staff to create and support video and audio webcasts / podcasts, troubleshoot problems, respond to security and reporting requirements and incidents, support over 200 SQL databases, support several unit Web applications, and support SI internet domain name acquisition and maintenance.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Replace Web Servers	04/2006		09/2006
Procedures for Google Site Maps*	06/2008	12/2010	
Consolidate SQL server support	07/2008	05/2009	
Support NMNH in server consolidation	09/2009		
Establish 2 new 64-bit SQL 2005 clusters	11/2009		
Support SAAM in public Web migration to central supported servers	05/2008		11/2008
Migrate TeamSite to new server	09/2008		8/2008
Redesign Smithsonian Homepage	10/2009		
Provide Web Content Management development support to Museums and Units	12/2010		
Provide Google development search support to Museums and Units	12/2010		
Implement and support Web 3.0 technologies	12/2012		
Provide testing infrastructure for Web Content Management System	12/2010		
Provide testing infrastructure for websites	12/2010		

***** Procedures are in place for units to implement the site maps on their sites.

c. Benefits

Web infrastructure support benefits Smithsonian units and programs by:

- Providing a stable Web infrastructure that integrates with enterprise management, network, and security system infrastructure technology ;
- Reducing costs by sharing resources and improving reliability;
- Provides redundancy within the Smithsonian's Web infrastructure;
- Provides consistent technical support and guidance to units;
- Support a central Web application and content management system;
- Providing a solution that will improve management and productivity in posting to the Web public information for all functions.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2005	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

6.5.3 Web Search Engine (Google)

a. Description

When locating information on a Smithsonian website, internal or public, people principally use a Web search engine to find the appropriate Web page. Search is a critical component of enterprise IT infrastructures serving as most intuitive choice of user information discovery and retrieval.

Previously, the Institution's main website (www.si.edu) and various museum and unit websites used individually built search functions based on a wide selection of technologies ranging from integrated search servers to external search services, and integrated open-source or custom developed search solutions. This approach resulted in incomplete, inconsistent, and overall poor search results as users move from Smithsonian sub-site to Smithsonian sub-site.

In 2006, a Google search engine was deployed for use with the pubic and internal Smithsonian websites providing one common, best of breed, commercial-off-the-shelf enterprise search appliance across the Institution that can index up to 3 million webpages. The current search enhancement built on the Google search appliance made a sizable increase in the search scope, result relevancy and system response. However many other important functions still needed to be implemented including the following major components once funding is available:

1. **Universal search results.** Most digitized collection databases are in a propriety or custom-built system that is not optimal for enterprise crawling and search. A cost-effective approach such as Sitemaps addresses the different information organization structures of each system needed to expand the search scope to include the millions of digital collections. Additionally, sitemaps support directory lookup, exhibition information, and promotions that the public expects to be able to find through search engines.

2. **Enhance Architectural Design to increase system robustness, redundancy and reliability through Centralized Management Tools and Failover.** The Smithsonian needs to develop additional search infrastructure components to assist with the management of the large number of museum sites being integrated into one centralized search, and to capture system metrics which can be used to enhance future user experiences with search results. Additionally we need to design and implement a failover system along with procedures for backup and restore for internal and external search engines.

3. **Integrate new Google Search Technology & Applications** Continue to integrate the new Search technology and new Google applications to increase and optimize the use of search technologies at the Smithsonian.

The Center for Democracy & Technology's paper, *Hiding in Plain Sight: Why Important Government Information Cannot Be Found Through Commercial Search Engines* documents this growing trend for the public to find information through the use of public search websites such as Yahoo and Google as described in the excerpts below.

> When Americans look for information online, they generally start by using a commercial search engine. According to industry figures, Americans used commercial search engines over 9 billion times in September alone. Search is also the starting point for locating government information online, whether people are looking for information about the safety of drinking water, legislation on domestic spying, or the availability of government jobs. But very often, searches come up short.
>
> Many federal agencies operate Websites that are simply not configured to enable access through popular search engines. These Websites don't allow search engines to "crawl" them, an industry term for indexing online content, and sometimes even block sites from being found by search engines.

The above accurately reflects many of the challenges the Smithsonian faces in striving to increase the findability and ultimately the usability of information available through Smithsonian websites which have been created independently over several decades.

As begun in 2007, and continuing through the planning period, the Smithsonian will implement Google sitemaps to increase the efficiencies of Web crawlers employed by all search engines. Sitemap is a protocol that allows a webmaster to inform search engines about websites URLs contained in databases and/ or created dynamically making them available for crawling.

A Sitemap uses an XML file that lists the URLs for a website. Sitemaps allow webmasters to include additional information about each URL: when it was last updated, how often it changes, and how important it is in relation to other URLs in the site. This allows search engines to find a websites information and crawl the site more intelligently.

Sitemaps will be an invaluable tool for indexing Smithsonian content stored in databases and dynamically created websites, sitemaps will overcome technical hurdles such as those posed by dynamic databases and specialized interfaces. Currently, such content can't be accessed and indexed by search crawlers and therefore can't be found by search engines and often appear invisible to the typical search engine user. Since Google, MSN, Yahoo, and Ask now use the same protocol, sitemaps will let the biggest search engines return results with Smithsonian webpages.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Requirements specification	08/2005		08/2005
Award contract	09/2005		09/2005
Install search appliances	03/2006		05/2006
Perform testing	04/2006		07/2006
Production deployment	05/2006		07/2006
Installed test lab with two Google mini appliances	09/2006		09/2006
Create Search user group	11/2006		11/2006
Basic Google Training of 41 users (access the system, create collections, create page results)	11/2006		11/2006
Install Google search in PRISM main page	10/2006		10/2006
Create collections and support for NZP, NPG, NMAH, NSRC, Smithsonian public main site, & News Desk	12/2006		12/2006
Implement universal search results to add hidden content such as dynamic and database content	10/2007	12/2009	
Enhance Architectural Design by developing centralized tools and a failover architecture	12/2008	12/2009	
Integrate new Google search technology & applications***	12/2008	12/2010	

*** Units need to implement tools enabled by OCIO.

c. Benefits

An enterprise Web search engine provides a robust, scalable, and centrally-supported enterprise search engine that provides fast quality results for use across the Institution.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2006	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

6.5.4 *si.edu* Public Website

a. Description

Through the public Smithsonian home website, the Institution educates and informs the public about the Smithsonian by offering calendars of events, museum guides, educational resources, original research reports, and online image and object collections. Services provided by Web Services Division (WSD) for si.edu and the Internet fall into operational and developmental categories. The 2009 Web Strategy will most likely drive a redesign of the si.edu homepage during the planning period, and ultimately affect the design of top-level unit webpages in an effort to bring a cohesion to the navigation and presentation of common information on the websites.

WSD provides an IT infrastructure function that supports all program areas and provides the following services:

- Web application design, installation, trouble-shooting, and training;
- Database design, maintenance, backup and restoration, optimization, connectivity, and data migration;
- Web administration services;
- Statistical data gathering on website usage;
- Smithsonian webmaster email account maintenance;
- Domain name acquisition for Institutional units;
- File transfer (ftp) services for internal and external customers;
- Web projects and online exhibitions consultation;
- Collection and distribution of visitor-related response collections, such as feedback data.

This is a level of effort function.

b. Benefits

The Institution is able to expand its outreach and take Smithsonian resources—collections, research, exhibitions, educational programs, and visitor information—to those unable to visit in person. In FY 2008, the Institution's museum and research center websites experienced nearly 173 million visitor sessions. The main Smithsonian website alone experienced nearly 14 million visitor sessions—a popular destination for learning about events and activities at the Institution when planning a visit to the Smithsonian.

6.5.5 Prism, the Smithsonian Intranet

a. Description

Prism, the Smithsonian Intranet, provides information about the Institution for Smithsonian staff and volunteers. It provides one central location to quickly provide staff a quick set of common desktop resources regardless of their duty location. Prism has been serving Smithsonian employees since 1996 by providing staff information such as the online telephone directory, calendars, internal publications, training opportunities, an electronic forum for Smithsonian groups and committees, software and hardware upgrade recommendations, electronic Help Desk access, volunteer handbooks, and administrative forms. It also is used to post internal policies and guidelines, organizational changes, and directives. Prism provides browser access to internal Web servers and access to the Internet for email, and database searches.

In FY 2009, Prism is being redesigned on the Microsoft Office Sharepoint Server 2007 platform with following objectives to be accomplished in a phased approach throughout FY 2009-2010.

- Staff productivity and efficiency
  - Allow quick access to a well-organized knowledgebase of information
  - Provide job aids and everyday workflow support
  - Convert Microsoft Word and Adobe PDF forms to fillable, web-based forms with automatic submittal and approval routing, including the use of digital signature authentication.

- Collaboration
  - Facilitate collaboration on projects & committees within and between units
  - Capture staff expertise through blogs/wikis and discussion boards
  - Provide access to intranet from remote locations

- Communication
  - Allow news and announcements to be communicated SI-wide
  - Provide an internal staff events calendar, containing staff events currently announced via SI-wide email

- Authoritative, up-to-date, trusted content
  - Democratize the Web publishing process, allowing non-technical staff to post directly to the intranet. This allows the knowledge workers to publish and maintain content when and where appropriate.
  - Intranet staff and site owners both in OCIO and units dedicated to maintaining content on an ongoing basis.

Project Approach: The approach to the project consists of initially releasing an interim homepage redesign (“Prism 1.1”) using the current HTML/ASP platform to immediately improve usability and to provide a vehicle for internal communications, but while maintaining consistency with the current intranet. This homepage was released in February 2009.

During FY 2009 and FY 2010, the primary Prism redesign will be re-invented entirely on the Sharepoint platform. The delivery of the redesigned intranet will occur in two major phases:

- **Phase 1 – "Prism 2.0" in Sharepoint:** Consists of a complete redesign of all levels and content within Prism; "Prism content" is defined as any page or document that is of pan-institutional interest, and currently exists on Prism. During this phase, news, announcements, and the internal events calendar will be implemented, as well as collaboration features such as project management sites, blogs, wikis, and online forms.
- **Phase 2 – "Prism 2.5":** OCIO will continue to work with units to enhance Prism with additional content & features, including the provision of "extranet" functionality – the ability to access the intranet remotely – which will provide greater collaboration possibilities with external colleagues and researchers. In addition, staff will be able to personalize their intranet experience and build custom pages to suit their interests, and business intelligence will be made available in the form of dashboards that show statistical data and charts at a glance, aggregated on customizable Web pages.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
SOW & RFQ published; contract awarded	9/2008		9/2008
Project Kickoff	10/2008		10/2008
Phase 1:			
Functional & Technical Requirements	02/2009		02/2009
High-Level Architecture	02/2009		02/2009
Prototyping & Usability Analysis (iterative)	04/2009		
Plans for Security, Operations, Backup, Administration	03/2009		
Intranet & Calendaring Technical Design & Prototyping	02/2009		
Plans for Testing, Training, Support	04/2009		
Hardware/Software Purchased/Donated	04/2009		
Development & Testing (including content development)	07/2009		
Deployment/Production Trial Review	9/2009		
Phase 2 Additional Functionality	TBD/ 2010		

c. Benefits

Through Prism, the Institution facilitates communication to employees and volunteers and creates an environment in which to manage electronic forms. In addition, the Prism redesign will allow collaboration through shared document libraries and discussion threads. In doing so, it will relieve the burden on the email system, which staff currently must use for discussions, to send/receive large files, to receive all SI-wide communication of news and events. The reorganization of Prism content and automated routing of online forms will greatly improve staff productivity and efficiency, and the ability of knowledge workers to post directly to the intranet will increase the quality and timeliness of the content.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:		*2009 (Sharepoint)*
		1996 initial launch
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

6.5.6 Exhibit Zone

a. Description

The Exhibit Zone provides visitors to Smithsonian museums with secure direct access to the Internet, servers located in the Smithsonian de-militarized zone (DMZ), or at the partners' sites in support of physical exhibits in the museum while protecting the integrity of SInet.

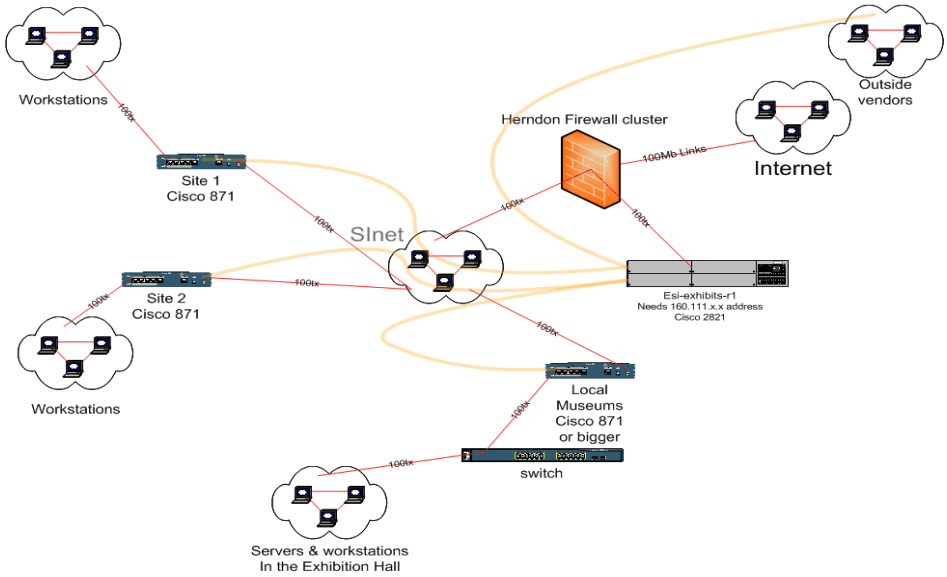


Exhibit Zone Architecture

Traffic in the exhibit zone travels separately from the regular Smithsonian internal traffic via a Virtual Private Network (VPN) used to create isolated tunnels of connectivity over SInet. Enterprise firewall rules then restrict the protocols that may transit the Exhibit Zone. All of this is accomplished via several infrastructure components installed in a separate firewall zone attached to Enterprise Security Infrastructure:

- A Cisco 2821 router at the Herndon data center and one or more Cisco 871 routers at the museum sites are configured to form IPSec VPN tunnels through the existing high-speed links between the museums and the Herndon data center. (All traffic in the Exhibit Zone starts at the Cisco 871s and ends at the Cisco 2821.)
- A Bluecoat proxy server is sitting by the side of the Cisco 2821 to provide Web proxy services and to allow control of the visited URLs.

- A new SMTP gateway relays outbound Exhibit Zone e-mail.
- Kiosks and workstations on the exhibit floors in the museums are connected either directly or via network switches to the Cisco 871 routers.

The traffic coming out from the Cisco 2821 router is directed to the Internet, the DMZ or the partners' sites by the firewalls in the Herndon data center in separate and encapsulated paths through the Smithsonian's existing high speed links. The devices inside the Exhibit Zone network have no access to any of the internal SInet resources. Likewise, SInet devices cannot access any of the exhibit kiosks and servers except when using VPN client.

OCIO manages all the routers and other zone components. The museums are responsible for managing their own kiosks, exhibit workstations and the exhibit servers. Remote connectivity is obtained through the respective Cisco 871 router via a Cisco VPN client on a PC.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
SAAM / NPG	06/2006		06/2006
NZP	10/2006		09/2006
NMAH	10/2006		10/2006
CHNDM	12/2006		12/2006
NMNH	5/2007		05/2007
NMAI	7/2007		6/2007
NASM	12/2008		2/2008
FSG	12/2008		6/2008
NMAfA	12/2008		6/2008

c. Benefits

The Exhibit Zone brings dedicated and secure Internet access right to the exhibit floor at all the museums over the existing SInet, while the traffic remains isolated from SI internal network infrastructure via Virtual Private Network (VPN) connections. As a result, Smithsonian's network is protected from unauthorized access, while the visitors get to harness the power of Smithsonian high speed fiber optic network to greatly enhance their Smithsonian experience. In 2008, OCIO also provided the museums that use the Smithsonian's secure wireless network with wireless Exhibit Zone--further giving more freedom to the exhibit's kiosks and display stations positions.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2006	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	• CHNDM • FSG • NMAH • NMAI • NASM	• NMAfA • NMNH • NPG • NZP • SAAM

6.6 Data Center Services

The Institution's data center in Herndon houses 644 servers, wide-area network (WAN) routing, and network backbone switches.

6.6.1 Data Center Operations

a. Description

The data center houses the primary network servers and a growing collection of application and Web servers that support multiple capabilities—many of which are considered mission critical. The data center is central to the data and voice communications for the Institution. Its operation and maintenance is essential to the functions of the museums, research centers, and administrative units, as well as public access to information.

Managing growth and change, ensuring reliable services, and providing fast, effective support to end-users are critical success factors for the data center operations staff that has responsibility for daily inspection of all production systems and equipment, managing magnetic media, trouble-shooting, resolving problems, and distributing reports.

b. Benefits

Data center services are an IT infrastructure function that supports all areas of the Institution. Operational support enables the Smithsonian to maintain current production of the Institution's major application systems.

6.6.2 Data Center Server & Room Consolidation

a. Description

Application servers are deployed throughout the Smithsonian to support the IT infrastructure and unit applications. Many employees depend on these servers and the data that resides in them to perform their day-to-day work. The servers are used to support administrative and program applications. Reliable access to these application services requires a robust infrastructure with reasonably current devices. The Smithsonian Data Center located in Herndon, VA offers a high tech environment with a full complement of redundant infrastructure elements to meet the needs of the overall Institution.

Server consolidation remains a goal for many organizations, but the reasons for doing it have somewhat shifted and the Smithsonian is no exception. Cost is not necessarily the driving factor for analyzing and implementing server consolidation options. Other factors, such as improving control of the environment, consistent and superior customer service, easing access to information, streamlining processes and reducing inefficiencies, reducing security risks, and building business continuity, drive the desire for server consolidation.

A server consolidation project may present many cost saving opportunities, such as running fewer servers, consolidating applications, virtualization of servers, and reducing IT support and operational costs. Although the cost savings may attract organizations to initiate such a project, understanding and calculating the potential additional costs in server consolidation is important as well.

In FY 2007, an analysis of the servers located at the units within the Smithsonian was conducted by an independent contractor and recommendations were made for which systems should be relocated to the data center to allow the Smithsonian to operate in the most effective and efficient manner. Exception criteria were developed to analyze the individual servers resulting in over 85% of the servers residing in the units today being recommended for relocation. Annual savings were projected to be nearly $278 thousand (the difference of the cost for the units to support the servers versus OCIO). In addition, OCIO estimates a savings of over $1.1M annually in contractor costs across the Institution.

During FY 2008, the actual number of servers needing to be relocated or retired was actually much higher than identified in the 2007 study. As such, the schedule to complete the relocation, with the exception of NMAI, was extended into the early in FY 2009. The NMAI servers will be relocated after a redundant link is established between NMAI and HDC.

To maximize efficiencies and to begin to realize financial savings, after the relocation is completed a plan will be established to consolidate the remaining servers to reduce both the number of servers, and electrical/cooling needs for the servers. A long term goal will be to use virtualization to further reduce the number of servers and therefore the resources needed to maintain the servers.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Replace/consolidate application servers Phase 1: FMS, FTP, Web	03/2003		07/2003
Consolidate Travel Manager servers	04/2004		07/2004
Server Relocation Study			09/2007
Analysis of the condition of unit application servers, except NMAI, identified for relocation	03/2008		09/2008
Analysis of the condition of NMAI application servers identified for relocation	06/2009	TBD	
Initiate relocating unit application servers (except NMAI) to Smithsonian Data Center	01/2007		06/2008
Complete Phase 1 Relocation of unit application servers, except NMAI	06/2007	02/2009	
Complete relocation of NMAI Servers	09/2009		
Consolidate application servers	TBD		

c. Benefits

There are a number of benefits that result from co-locating servers to one central location with cost being only one of them. Initial assumption for co-location is there will be a significant cost savings seen from reducing the number of servers that must be acquired, deployed and managed. Long term savings can be achieved through more efficient resource utilization, improved availability and reduced operating costs.

Improved standardization - Standards are more easily enforced across fewer servers. For example, with fewer servers to monitor and manage, an organization can more easily ensure that they are running the same version of software, including service packs and patches, which benefits organizations in making management of the servers more consistent and efficient.

Improved utilization - Improvements to server scalability—that is a system's ability to easily accommodate additional load, as well as the ability to run applications side by side and manage their resource allocation—can lead to better server utilization. With fewer servers, each server is more likely to be using all of its resources. Having fewer servers also creates an opportunity for fewer software licenses, or the opportunity to ensure better utilization of software licenses.

Improved security - Fewer servers present a smaller attack surface and create an environment that is easier to monitor for security problems and patch in the event of vulnerabilities. OMB mandates can be centrally controlled and distributed to meet compliance.

Improved management - Fewer servers combined with the other improvements of consolidation, such as reducing the number of locations where servers are installed, may result in fewer administrators to manage the servers or may simply allow the administrators to do a better job managing them, such as keeping them up-to-date with patches. Fewer servers can speed data backup operations and reduce the complexity of restore operations when required.

Improved business intelligence - Consolidating data on fewer servers may create opportunities to mine it for information that could not be as easily accessed and analyzed were it stored in multiple, disparate databases.

Improved facilities utilization - Centralizing and reducing the numbers of servers may reduce the number of computer or server rooms that require specialized power, air-conditioning, and physical security.

Improved redundancy - Clustered servers provide failover redundancy that individual units may not be able to provide. One centralized resource can provide service to multiple units and one backup resource can serve as backup to multiple units. This redundancy can't be established as easily by each unit.

Cost savings - Cost savings through not having to build out datacenter facilities at individual unit level. Cost savings in contractor support for infrastructure and server support. Cost savings in decommissioning duplicate functioning servers.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2003	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

6.6.3 Disaster Recovery Services

a. Description

Disaster recovery planning is essential for establishing activities necessary to restore the functionality of an IT system in the event of short-term problems, such as power failures, as well as major disasters, that prevent access to IT systems and the information they contain. The Institution has prepared disaster recovery plans for 15 major IT systems including the IT Infrastructure. The disaster recovery plans document the procedures for restoring service and processing critical applications, at an alternate site if necessary, in the event of a major hardware failure or unavailability of the Smithsonian's data center services.

All major finance and human resources management systems, as well as most facilities systems, have provisions for relocating to an alternate site for processing in case of a disaster. The alternate site is operated by SunGard—a firm that specializes in disaster recovery. In addition, the ERP System disaster recovery plan is exercised annually at the SunGard computer facility in Philadelphia. The remaining 11 disaster recovery plans require obtaining hardware via lease or purchase to reestablish operations.

In the event of either a natural or man-made disaster that affects our computer facilities, the Institution must be able to restore service for its major IT systems at an alternate location as quickly as possible. Pending availability of funds, OCIO will contract for disaster recovery services for all of the Institution's major IT systems. This includes: Smithsonian Institution Research and Information System (SIRIS); Facilities Management System (FMS); NMAI Collections Information System; NMNH Research and Collections Information System (RCIS); Art Collections Information System (ArtCIS), National Museum of American History CIS; the Digital Asset Management System and key components of the network infrastructure such as the Web (www.si.edu), directory, email, Blackberry, and limited file and print services. In order to process at a remote location additional leased line capacity also will be needed.

The Institution also contracts for off-site storage of magnetic tape backups of selected application systems. These services provide fundamental protection against loss of Smithsonian data assets.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Select disaster recovery vendor (SunGard)	07/2002		10/2002
Exercise ERP disaster recovery plan	10/2002		06/2003
Exercise ERP disaster recovery plan	06/2003		06/2003
Develop IT infrastructure disaster recovery plan	09/2003		10/2003
Develop disaster recovery plans for major IT systems	09/2003		12/2004

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Initiate exercising ERP disaster recovery plan (Financials System & FMS), annually	06/2004		07/2004
Initiate exercising disaster recovery plans for FMS, annually	06/2005		06/2005
Initiate exercising disaster recovery plans for most facilities systems, annually	07/2007		07/2007
Initiate exercising disaster recovery plans for WebTA, annually	04/2008		04/2008
Initiate exercising disaster recovery plans for all remaining major IT systems, web, and email*	06/2007	TBD	

* Dependent on funding being indentified

c. Benefits

In the event of a major hardware or software failure or destruction of facilities, the Institution will be able to restore services needed to process critical applications.

d. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	2002
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Systems Supported:	• ERP • FMS • Medgate • VCMS • PAYES • WebTA • CACS

6.7. Customer Support Services

The Institution relies heavily on IT systems and the supporting IT infrastructure. The OCIO Customer Support Services Division (CSSD) provides its customers with operational IT support, manages the Periodic Desktop Hardware Replacement Program, disseminates Smithsonian-wide information to customers, creates and maintains OCIO's *Customer Service Handbook*, and measures and reports adherence by OCIO to service commitments.

6.7.1 Help Desk Services

a. Description

The OCIO Help Desk is the Institution's single point of contact for logging, tracking, reporting, and resolving IT infrastructure and telecommunications problems and OCIO service requests. Smithsonian units with their own IT staffs may opt to use OCIO's Help Desk to create tickets for unit provided IT services, or operate their own help desk. In the latter case, the unit staff will generally call the OCIO Help Desk for OCIO provided services such as network problems, IT security, the ERP, telecommunications, or the Facilities Management System.

The OCIO Help Desk provides end-to-end ownership of problems and service requests that may need to be referred or escalated to more specialized OCIO organizations, such as the Network Operations Branch, for resolution. It also provides troubleshooting for the customer and, whenever possible, problem resolution.

The branch uses a help desk ticket system—HEAT—for recording and tracking problems and service requests and to monitor and escalate tickets as required, with special escalation procedures for critical problems. It also processes requests for services (e.g., install desktop software, issue SI-wide announcements, create network accounts, change/move telephone lines, add voicemail boxes).

Activities of the OCIO Help Desk include:

- Consolidating and improving Help Desk services provided to units for systems such as telecommunications, ERP Financials and HRMS, Travel Manager, and network services;
- Establishing policies, procedures, and processes for customer notification of problems and planned outages, problem escalation, and root-cause analysis reporting;
- Developing and posting to Prism forms that allow customers to request more easily services such as the issuing of SI-wide announcements and the creation of network accounts;
- Measuring and reporting adherence to customer service commitments.

b. Benefits

The OCIO Help Desk is an IT infrastructure function that supports all program areas. It provides benefits to customers and staff alike by:

- Providing a single point of contact for reporting IT and telecommunications problems and requesting services;
- Providing prompt completion/resolution of specific types of service requests and problems;
- Ensuring that problems and service requests are handled properly;
- Identifying and tracking recurring problems in a proactive manner.

6.7.2 Desktop Services

a. Description

The Desktop Services Branch is responsible for resolving problems with and providing services for the desktop hardware in supported units. It also provides office automation software to Smithsonian units and manages the periodic replacement of desktop computers and workstations; and network and local printers.

Desktop Services staff strives to meet customer expectations for courteous, prompt, and expert service, even as demands have risen steadily with the Institution's increasing dependency on and the growing complexity of IT. Desktop Services has a significant impact on overall customer satisfaction with IT.

b. Benefits

Desktop Services provide benefits to Smithsonian users by promptly resolving desktop problems, and ensuring timely and successful completion of service requests.

6.7.2.1 Periodic Desktop Hardware Replacement Program

a. Description

The Smithsonian deploys desktop computers, workstations, network printers, and local printers to employees, interns, fellows, and supporting contractors. Desktop computers are used in a networked office environment for a variety of functions that include collections management, email, Web access, word processing, spreadsheets, financial and human resources management, and purchasing. Workstations are used for many of these same functions, plus Web development, graphic publications, and scientific research.

The Smithsonian began replacing desktop hardware on a four-year life cycle beginning in FY 2004—about 1,500 PCs each year plus smaller numbers of workstations and local and network printers. The four-year replacement life cycle

is based on industry best practices and changes in technology and software—older PCs and workstations frequently are unable to handle newer requirements such as those for memory or CPU processing power.

Starting in FY 2008, OCIO ceased differentiating between graphic and scientific workstations. There were no significant differences identified between the requirements of scientific workstations and graphic workstations which were already covered under the Periodic Desktop Hardware Replacement Program Workstations.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
FY 2004 Hardware Replacement:			
Prepare Hardware Replacement Plan	10/2003		10/2003
Replace 1,991 desktop workstations	06/2004		06/2004
Replace 113 Macs	08/2004		08/2004
Replace 159 printers	08/2004		08/2004
FY 2005 Hardware Replacement:			
Prepare Hardware Replacement Plan	08/2004		08/2004
Replace 1,486 desktop workstations	06/2005		06/2005
Replace 127 Graphic Macs	05/2005		05/2005
Replace 335 printers	05/2005		05/2005
Replace 83 Scientific Macs	09/2007		09/2005
FY 2006 Hardware Replacement:			
Prepare Hardware Replacement Plan	06/2005		06/2005
Replace 1,578 desktop workstations	03/2006		05/2006
Replace 98 Graphic Macs	03/2006		03/2006
Replace 300 printers	06/2006		05/2006
Replace 66 Scientific Macs			10/2006
FY 2007 Hardware Replacement:			
Prepare Hardware Replacement Plan	08/2006		06/2006
Replace desktop workstations	03/2007		07/2007
Replace Graphic Macs	04/2007		10/2007
Replace printers	06/2007		09/2007
Replace 83 Scientific Macs			10/2007
FY 2008 Hardware Replacement:			
Prepare Hardware Replacement Plan	08/2007		07/2007
Replace desktop PCs	03/2008		04/2008

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Replace workstations	04/2008		07/2008
Replace printers	06/2008		07/2008
FY 2009 Hardware Replacement[2]:			
Prepare Hardware Replacement Plan	08/2008		10/2008
Replace desktop PCs	03/2009	05/2009	
Replace workstations	04/2009	07/2009	
Replace printers	06/2009	08/2009	

c. Benefits

The Periodic Desktop Hardware Replacement Program benefits all Institution staff by ensuring they have reliable desktop hardware with which to perform their jobs. For the scientific community, having reliable and up-to-date workstations is a key factor in maintaining the scientific eminence of the Smithsonian with the ability to:

- Manipulate and reduce large data sets;
- Produce and analyze high resolution images;
- Run the latest scientific software packages.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2003	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Systems Supported:	•	SI-wide

[2] At the time of publication, cuts are expected to FY 2009 PDHRP funding. Based on the size of the cuts, some planned replacements may be deferred until FY 2010.

6.7.2.2 Desktop Software

Desktop software includes the operating system, office automation (word processing, spreadsheet, and presentation graphics), desktop database management, desktop publishing, Web browsers, and anti-virus software. Because the Institution has not until recently had a standard suite of desktop software, units experienced problems exchanging data between multiple office automation and database management products and/or product versions. Operating systems and *Microsoft Office* are upgraded to the newest versions in conjunction with replacement of desktop and graphics workstations.

The Smithsonian maintains multi-user licenses for the desktop software products that follow—with the exception that operating systems and *Microsoft Office* are bundled with the purchase of the new PCs and Mac desktop workstations.

Desktop Software	
Operating system	• Windows XP Professional • Mac OS X
Applications	• Microsoft Office 2007 (PCs) • Microsoft Office 2008 (Macs)
Internet browser	Internet Explorer 7
Electronic mail client	• Outlook (PCs) • Entourage (Macs)
Anti-virus software	• McAfee VirusScan • EPO Client • Virex
Security software	• Cisco Security Agent • Spy Sweeper

CHAPTER 7
ENTERPRISE ARCHITECTURE & PLANNING INITIATIVES

7.1 Enterprise Architecture

Enterprise Architecture looks at the strategies, functions, processes, data, systems, organizations and people of an enterprise in order to better align resources with the strategic objectives of the organization. It provides an enterprise-wide functional view of an organization which reduces redundancy and promotes a shared view of data and processes across the organization. By identifying common processes and data, the Smithsonian can use shared services and systems where needed, thus leveraging information technology across the enterprise. This, in turn, reduces the complexity of the IT environment, improves reliability, and reduces costs. The architecture establishes standards that guide the design of new systems and sets the strategic direction for implementing critical enterprise-wide technologies such as information system security.

The Institution's Chief Technology Officer is responsible for recommending the enterprise-level architecture strategy, developing and approving the high-level and detailed designs for all Smithsonian Automated Information Systems (AISs), managing the evolution of the Institution's IT infrastructure, and developing and maintaining its Enterprise Architecture (EA) models.

Line of Business	Sub-function
Planning and Budgeting (304)	Enterprise Architecture (103)
Information and Technology Management (404)	Lifecycle/Change Management (137)

7.1.1 Enterprise System Architecture Services

a. Description

The system architecture staff, under the Chief Technology Officer, defines Smithsonian enterprise system architecture projects. The enterprise system architecture includes a current and target view—the situation the Smithsonian wishes to create and maintain by managing the IT portfolio—of information requirements, flows, and system interfaces across organizational boundaries.

System architecture staff ensure that the physical and logical system components are defined and that infrastructure, network, capacity, and performance engineering are completed as part of the design and project planning effort. System architecture staff also may perform related engineering tasks such as conducting architectural assessments and recommendations; and developing, prototyping, or piloting a new or high-risk technology component. These activities are described in more detail in the Engineering Services section of this chapter.

A key system architecture role is identifying enabling technologies that will support functional and programmatic objectives of the Smithsonian, which is essential if its computing systems are to support rapidly changing administrative, museum, and research unit requirements that often are driven by world-wide trends in IT systems. To define enabling technologies, the system architecture staff conducts ongoing investigations of near- and long-term computer technologies and provides long-term strategic analysis and recommendations. The process, Technology Requirements Synthesis, includes:

- Defining technology requirements to meet Smithsonian objectives;
- Identifying technologies to meet those requirements;
- Identifying cross-cutting technologies that reduce cost or risk so that new opportunities are feasible;
- Ongoing technology development, such as continued assessment of enabling technologies;
- Applying existing capabilities;
- Identifying cases where required technology does not exist, or is not cost effective and Institutional objectives cannot be realized.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
IT Product Baseline	12/2000		03/2001
Publish TRM Version 1.0	12/2001		01/2002
Added Service Component Reference Model (SRM) mappings for all major system components	04/2005		04/2005

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Refine enterprise security high-level architecture to include an assessment of virtual private network (VPN) and encryption requirements and a generic application server security architecture	09/2005		06/2006
Develop Business Reference Model (BRM)	02/2006		01/2006
Develop Performance Reference Model (PRM)	02/2006		01/2006
Select and implement EA Repository	09/2006		09/2006
Develop Data Reference Model (DRM)	02/2007		02/2007
Define Education Segment Architecture	02/2007		02/2007
Mapped SI TRM to FEA TRM	02/2008		02/2008
Define Pan-Institutional Segment Architecture	07/2008		07/2009

c. Benefits

The System Architecture and Product Assurance services support all AIS and IT infrastructure projects and enable the Institution to maintain, improve, and enhance its current enterprise architecture and migrate automated information systems to the evolving target enterprise architecture. Enterprise system architecture and product assurance services benefit the Smithsonian by:

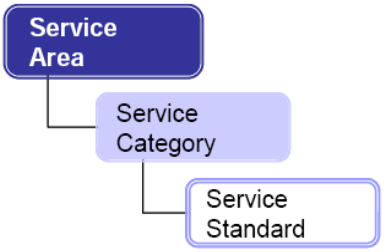
- Defining and documenting the current IT environment in order to support technical and financial planning;
- Promoting IT interoperability among all automated information systems through a shared vision of the Smithsonian-wide enterprise architecture;
- Reducing duplicate design, engineering, development, integration, operations, and maintenance costs;
- Eliminating duplicate functionality in software and hardware components by identifying common components that can be used or shared by IT development managers;
- Achieving economies-of-scale by identifying potential site software license, and consolidating hardware acquisition and maintenance contracts;
- Improving customer service through product standardization;
- Identifying and planning strategically for the implementation of enabling and emerging technologies needed to support mission-critical unit functions.

7.1.2 Enterprise Architecture Models

The Smithsonian Enterprise Architecture is documented in the technical, business, performance, data and service component reference models. The System Architecture and Product Assurance staff update its enterprise architecture models as segment architectures and other IT initiatives are completed which provide changes to the overall enterprise architecture. The following paragraphs detail the Smithsonian Enterprise Architecture models.

7.1.2.1 Technical Reference Model

The mechanism used to define and govern the enterprise technical architecture is the Technical Reference Model (TRM).



The TRM defines IT standards and products used by the Smithsonian and provides a set of consistent Institution-wide standards and products for IT project managers and staff. Its purpose is to guide IT investments and to:

- Capture the current Smithsonian hardware and software architecture, which helps in acquiring information technology products and services;
- Define a target set of high-priority IT technologies, standards, and products needed to support program unit missions and functions; helping staff to develop and maintain AISs;
- Identify gaps between the current and target architecture in order to establish the IT direction and evolve the IT infrastructure.

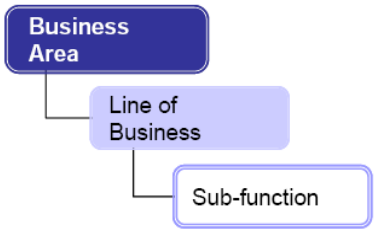
The TRM serves as a communications and education vehicle by providing a comprehensive view of all Smithsonian IT hardware and software components and associated standards. Without identification and enforcement of standards, chaos results in the form of incompatible formats, insufficient security, unknown data integrity, and questionable authenticity of electronic information. Using standards enables unit application systems and infrastructure systems to be:

- Modular, flexible, and adaptable;
- Vendor-independent for more cost-effective service support;
- Loosely coupled with interchangeable parts for easier component replacement as technology evolves;
- Less costly over the system life.

The TRM outlines a suite of selected standards and standards-based commercial products that define the services, interfaces, protocols, and supporting data formats for implementation of a standards-based IT infrastructure. The Smithsonian updates the TRM at least once a year with mappings to the FEA TRM Service Areas, Categories and Standards.

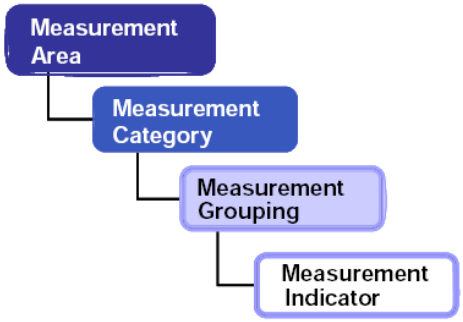
7.1.2.2 Business Reference Model

The Business Reference Model (BRM) provides a functional view of the enterprise and describes not only the business of the Smithsonian Institution, but how the Smithsonian's core lines of business align with the Federal Enterprise Architecture's business areas, core lines of business and sub-functions. The Smithsonian's BRM enables the Institution to look across the organization to identify like business functions and processes and the technology which enables them. Using this information, the Smithsonian is able to make informed decisions about technology investments which can be leveraged across the Institution.



7.1.2.3 Performance Reference Model

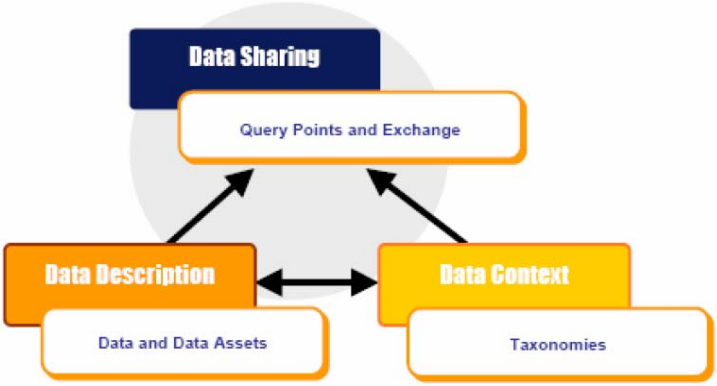
The Smithsonian Performance Reference Model (PRM) measures the performance of major IT investments and their contribution to program performance in order to evaluate their success and impact on the Smithsonian's strategic outcomes. Measurements are selected and tracked in accordance with the Federal Enterprise Architecture's Performance Reference Model (PRM) developed by the Office of Management & Budget to provide a standardized framework for measuring performance across agencies.



At the Smithsonian, IT planning, budgeting, and performance measures have been integrated into the Institution's budget and planning process. IT initiatives are selected based upon their expected contribution in helping the Institution meet its core mission strategic goals.

7.1.2.4 Data Reference Model

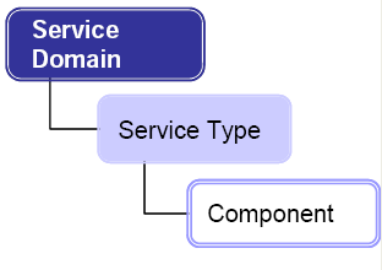
The Data Reference Model (DRM) provides a standard way to describe data across the federal government in order to promote information sharing across agencies.



The Smithsonian Data Reference Model was submitted as part of the 2007 Enterprise Architecture Assessment and continues to be updated as segment architectures are developed and refined.

7.1.2.5 Service Component Reference Model

The Service Component Reference Model (SRM) is a business and performance-driven, functional framework that classifies Service Components with respect to how they support business and/or performance objectives. The use of the SRM enables the categorization of the Institution's IT investments, assets and infrastructure by common definitions and purposes.



This includes a mapping to the applicable SRM Service Domains, Types, and Components. These mappings also tie back to the Exhibit 300s the Smithsonian submits to OMB. The Smithsonian's SRM is maintained as part of the overall EA repository and is updated as segment architectures are developed and refined.

7.1.3 E-Government Initiatives

The Smithsonian Institution, as a Trust Instrumentality of the United States, is not subject to the E-Government Act. As stewards of the Trust, Smithsonian management has committed to evaluating each E-Government Initiative and adopting them where it is both feasible and beneficial to the mission of the Institution. In many cases, the initiatives put forth under the E-Government umbrella simply do not apply to or support the business of the Smithsonian. In particular, the composition of Smithsonian staff to include not only Federal employees but also Trust, Smithsonian Enterprises, and overseas employees at STRI which adds to the challenge in fitting into many of these initiatives. The following is a synopsis of the E-Government Initiatives that the Smithsonian has either chosen to adopt, or are under consideration for future adoption during the planning period.

Initiative	Service Description
E-Government Travel *Status:* Adopted **I**	The Smithsonian has a varied staff comprised of federal, Trust, Smithsonian Enterprises and Panamanian employees for which it must develop and deploy a comprehensive and equitable travel policy and process. Smithsonian management determined that a single travel policy and common travel process would be the best course of action and that the Federal Travel Regulations (FTR) were an appropriate guideline to adopt even though as a Trust Instrumentality of the United States, the Smithsonian is not subject to the FTR. Because the Smithsonian chooses to follow the FTR, use of the E-Government Travel service was an appealing alternative to our legacy travel system. In FY 2007, the Smithsonian deployed GovTrip after a comprehensive cost of ownership analysis, market research with other federal agencies that had already completed or were actively deploying one of the three E-Government Travel solutions, and open competition. GovTrip usage has exceeded our initial projections with regard to online booking, achieving nearly an 80% online adopt rate. The Smithsonian continues to improve the process supporting our large percentage of International travel, and in 2009 selected Executive Travel Associates to efficiently plan and book complex domestic and international trips in conjunction with the GovTrip system.

Initiative	Service Description
EHRI *Status:* Partially Adopted	Enterprise Human Resources Integration (EHRI) is designed to provide comprehensive and standard workforce planning tools to all government agencies. Additionally the initiative is aggregating data from across the entire federal government to provide a comprehensive view of the government workforce. The Smithsonian currently provides the EHRI team with data on our federal employees, but the EHRI effort does not currently meet the Institution's workforce planning needs with regard to Trust, Smithsonian Enterprises and Panamanian staff. The Smithsonian was informed at the end of FY 08 that the Office of Personnel Management (OPM) prohibited the inclusion of non-civil service employees in OPM systems, including EHRI. The Smithsonian requires a comprehensive solution that includes and considers our entire staff and has opted to maintain our legacy systems for our workforce planning efforts. The Smithsonian will continue to provide the EHRI initiative with data on our federal staff, providing OPM with the ability to conduct accurate government-wide workforce analysis.
E-Clearance *Status:* Partially Adopted	The Smithsonian Institution is participating in the E-Clearance Initiative by using its E-QIP tool to automate the submission background investigation forms on the Institution's staff, contractors, volunteers, and interns who are issued Smithsonian badges. Duties of Smithsonian staff do not require National Security Investigations and as such limits the Smithsonian's participation in this initiative to non-clearance investigations. Additionally OPM provides background investigation results to the CVS clearinghouse on behalf of the Institution and Smithsonian is working with the E-Clearance Initiative to provide the Institution with the ability to update CVS directly.

Initiative	Service Description
E-Payroll *Status:* Adopted	One of the first E-Government Initiatives to be deployed and provide immediate benefits was E-Payroll. The Smithsonian recognized very early that processing payroll was not a core function of the Institution. Furthermore, there are no special circumstances or anomalies that would lead the Smithsonian to conclude that a payroll provider could not provide this service for Smithsonian staff. The Smithsonian has effectively out-sourced payroll to the Department of the Interior's National Finance Center.
E-Training *Status:* Adopted	The E-Training Initiative provides a suite of training tools and course materials for the government workforce to help them meet their changing job demands. Courses are available via a Learning Management System: provides information on the availability of learning opportunities, and tracks the progress of individual students. Currently the Smithsonian uses a limited number of classes for specific Smithsonian personnel. The Smithsonian has identified some areas of need within the Institution that are not fully served by the E-Training offering and the Smithsonian is working to help broaden the depth and breadth of the training opportunities so that E-Training can be a more effective tool for the entire Institution.
E-Vital *Status:* Adopted	The federal government must be prepared to meet any emergency, natural or man-made, while continuing to provide the core services on which citizens depend. To help accomplish this task the Smithsonian implements well thought out emergency plans, routinely conducts disaster recovery drills and participates in initiatives such as E-Vital to ensure that senior Smithsonian management can maintain clear and open lines of communication during an emergency. The Smithsonian has identified critical staff and deployed the necessary tools to provide for continued communication and operation of vital Smithsonian functions during an emergency.

Initiative	Service Description
Federal Asset Sales *Status:* Adopted	The federal government is constantly seeking to dispose of excess property, both personal property such as furniture or automobiles to real property such as buildings and land. In an effort to make federal assets available to the widest possible audience the Federal Asset Sales Initiative has developed the GovSales.gov portal as a clearinghouse for federal assets. Additionally, several qualified service providers can manage the administrative tasks associated with asset disposal. The Smithsonian recognizes that disposal of property is not our core business and has an agreement in place with GSA to provide disposal services on behalf of the Institution via the Federal Asset Sales program.
HSPD-12 *Status:* Partially Adopted	As an organization that is deeply committed to safeguarding the Smithsonian Trust and the trust of the American people, the Smithsonian agrees in principle to the guidance laid out in HSPD 12 and is voluntarily complying with many of the requirements outlined, such as requiring background checks on contractors and employees, and reducing and safeguarding the collection and storage of personally identifiable information. As a Trust Instrumentality of the United States, Smithsonian is not subject to HSPD 12; the additional cost to procure the necessary equipment to issue and utilize PIV compliant credentials outweighs the benefits to the Institution.
Integrated Acquisition Environment *Status:* Adopted	The Integrated Acquisition Environment (IAE) is designed to improve the efficiency and effectiveness of the acquisition process by making use of and integrating various government-wide systems and resources. The Smithsonian is currently deploying additional modules to our PeopleSoft/Oracle ERP system that both refine and improve our ability to take full advantage of the integration opportunities created by IAE. While the Institution does not currently integrate with all of the IAE systems in a robust automated manner, by policy the Smithsonian has for quite some time been making use of the IAE systems and data to ensure our acquisition actions are completed correctly. The Smithsonian continues to work with IAE as our PeopleSoft/Oracle ERP matures.

Initiative	Service Description
Recreation One-Stop *Status:* Adopted	This Initiative provides a single source of information to the general public on recreational and leisure activities available from the government. The Smithsonian provides Recreation One-Stop with information on our exhibits, research, facilities and events in an effort to facilitate greater public awareness of the rich opportunities the Smithsonian offers. Recreation One-Stop augments the Smithsonian's own extensive online presence to enhance the overall Smithsonian experience.

7.1.4 Lines of Business Initiatives

The Federal Government line of business (LoB) initiatives are business-driven solutions targeted as specific functions that cut across agencies in the Federal Government. This guiding principle that led to the idea of a government-wide Line of Business is that they would relieve agencies of the administrative task of managing common IT applications thereby freeing up resources to concentrate on IT projects that directly relate to an agency's unique mission.

The Smithsonian continues to evaluate and monitor the following LOBs to determine when and if they may be a cost effective solution for the Smithsonian

Lines of Business	Service Description
• **Financial Management**	The Smithsonian Institution manages trust as well as appropriated funds, which presents a financial management challenge not faced by federal agencies and not currently addressed by the Line of Business Centers of Excellence. The Smithsonian evaluated the LoB service offerings but has concluded that the Institution must remain on our current Peoplesoft ERP through its scheduled life-cycle to ensure our Trust account needs are completely addressed. The Smithsonian has committed to evaluating the LoB service offerings as we make decisions about our next generation ERP solution.
• **Human Resource Management**	As with Smithsonian's financial management needs, the Institution's human resource needs cover more than just federal employees. Trust, Smithsonian Business Venture and STRI employees complicate the management of HR resources and the current LoB offerings fall short of the Institution's needs. The Smithsonian has committed to evaluating the LoB service offerings as we make decisions about or next generation ERP solution.
• **Geospatial**	The Smithsonian does not formally participate in the Geospatial Line of Business, but we recognize that many of our research activities, funded by the Trust or by grants, generate geospatial data that is shared with and made available through geospatial one-stop. Smithsonian will evaluate resource availability and consider taking a more active role in the Geospatial Line of Business during the planning period.

- **IT Infrastructure**

  Like many government organizations, Smithsonian is able to and does take advantage of government-wide IT infrastructure contract vehicles. Smithsonian has been a leader in the government space, pioneering a comprehensive Voice over Internet Protocol phone system, fiber optic networking and SI stands ready to adopt IPv6 having completed our testing and evaluation. As the government-wide contract vehicles change to the new NETWORX contract, SI will transition our contracts accordingly.

- **Information System Security**

  The Smithsonian recognizes and takes seriously its responsibility to safeguard and protect both its information and information system assets. The ISS LoB provides multiple services, not all of which effectively support the needs of the Institution. The Smithsonian has received waivers to the use of both the FISMA and Information Security Training service offerings and continues to work with the ISS LoB and their service providers to enhance the capabilities and flexibility of their offerings.

  The Smithsonian does participate in the Trusted Internet Connection (TIC) effort. As the TIC effort matures and solutions are made available to non-TICAP agencies, either from another Federal Agency or a NETWORX vendor, the Smithsonian plans to migrate to an appropriate solution.

7.1.5 Segment Architecture: Education

a. Description

For its initial Segment Architecture, the Smithsonian Institution selected the Education Line of Business under the Service for Citizens Business Area of the FEA PMO BRM. Smithsonian Education is made up of the education departments of 30 museums, research institutes, and units within the overall Institution. The Smithsonian Center for Education and Museum Studies (SCEMS) provides leadership in education at the Smithsonian and produces a variety of programs, services, and resources for the education and museum communities. The Center studies education at the Institution and builds consensus on standards for strengthening its educational programs, publications, and websites. The Smithsonian Council of Education Directors (SCED) represents each of these units and comes together to form the voice of Smithsonian Education as a whole. SCEMS is a member of SCED and the Council is chaired by the director of SCEMS.

SCEMS and SCED have established a three-phase multi-year approach to evaluating the relevance and effectiveness of Smithsonian-based Education programs. This project uses quantitative and qualitative methodologies to measure volume and patterns of educational program attendance at the Smithsonian. Developing, Conducting and Evaluating Educational Programs are a vital part of the Smithsonian's *Education* mission core Line of Business. This segment directly links to the Smithsonian Institution's Mission, Goals and Key Performance Indicators for Education:

- *Mission: the Increase and Diffusion of Knowledge*
- *Goals: Increased Public Engagement*
- *Key Performance Indicator's for Education:*
  - *Number of visitor sessions to Smithsonian Education Websites*
  - *Number of Participants in distance learning Programs*
  - *Number of people participating in education programs in Smithsonian Facilities.*

As a result of developing the segment architecture, an enterprise-wide standard for program types was established as well as agreed to data standards for program names, objectives, organizations, audience served, and a consistent method for counting and reporting educational program attendance data at the Smithsonian was developed as part of the Education Data Gathering and Evaluation (EDGE) system. This system in its first phase will collect standard educational program attendance data from 30 units across the Smithsonian Institution. In additional phases, it will include demographics of participants (phase II: Audience Demographics) and an assessment whether and to what degree Smithsonian Educational programming has met internal objectives and

engendered meaningful change in target audiences (phase III: Audience Outcomes).

"As is" Architecture
The current architecture describes the current ("as is") state of the agency in terms of performance, business, data, services, and technology. At a high-level this target architecture includes the following functionality:

- Due to the semi-autonomous business unit nature of SI museums and research institutes, multiple systems exist for program registration. Consequently participant data resides in many locations. A process for data aggregation is desirable.
- Program registration data is often not available for cross-organization analysis until after the program has completed. The exceptions are the few cases involving for-fee programs where individual units have implemented systems to register participants and issue tickets. The four organizations that do this have different systems. A process for accessing registration data before and during program execution is desirable.
- There is no central place to view and schedule venues. Each museum has its own method for scheduling. Policies for the type of programs that can be conducted are not standard across venues. A central process for venue scheduling is desirable.
- There is no automated way to schedule docents for the programs before they are conducted. A central process for docent scheduling is desirable. Ideally this should be linked to any venue scheduling process.
- There is no standardized mechanism for collecting online registrations for education programs into a Contact Relationship Management system for additional follow-up and marketing. Again, two units have developed a system for this leaving the majority of the Institution with a manual process which results in attendees either not being contacted again or being contacted by multiple units.

"To be" Architecture
The target architecture describes the future ("to be") state of the agency in terms of performance, business, data, services, and technology. At a high-level this target architecture should include the following functionality:

- A collaboration environment that will enable Smithsonian educators to share and disseminate ideas, best practices, standards, and audience research across all the education units and the museum community as a whole.
- A single-point of access for registration information / participant data in which data is displayed in real time (providing for easier participant evaluation with standard evaluation methods and the ability to evaluate program pre-registered attendance to adjust venue sizes as needed based on the popularity of pre-registered programs).
- The ability to set up program evaluation measures in the beginning of a program to enable instructors to better meet the measures.

- The ability, through data aggregation, for the Smithsonian to evaluate customer preferences and suggest additional programs an individual might enjoy based on what they are currently registering for.
- A single-point or limited number of points for scheduling all educational venues across Smithsonian.
- A single-point or limited number of points for scheduling docents
- A single system or limited number of systems for collecting participant information for contact relationship management
- A web-enabled portal that will enable customers to view online the universe of educational and public programs offered at the Smithsonian, register for their selected programs, view or download the accompanying pre or post-visit resources, locate information about any exhibits or collections which may relate to the program and evaluate their customer experience after completing their selected programs through rate-your-visit type applications and formal evaluation methods. Possibly interfacing with an Itinerary builder and allowing users to register for the programs they have built into their itinerary.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Education Segment Architecture Submitted	02/2007		06/2007
Work with Education Directors to continue to expand the Segment Architecture	09/2007	04/2008	
Submit OMB 300 for Education Segment to secure funding	09/2007		09/2007
Updated Education Segment Architecture	02/2008		02/2008

c. Benefits

- Smithsonian Education Strategic Plan – A major objective of the Education strategic plan is to identify, develop, and disseminate validated systems and models for evaluating the relevance and effectiveness of Smithsonian-based education programs, as well as to assess progress in multiple ways and from multiple perspectives.
- Reduction of Duplicate Systems and Data – A key goal of EA is cost reduction by reducing duplicate systems and data, providing stronger purchasing power by identifying enterprise needs and leveraging IT investments across the organization.
- Establishment of a Standardized Business, Process, and Related IT Environment – A key goal of EA is providing a standardized environment which makes efficient use of scarce resources and enables human resources to be leveraged across the organization (instead of needing to hire expertise on a system by system basis).

- The Desire for More Efficient Training and Orientation of New Hires – Documenting shared repeatable processes for education will provide a mechanism to train and orient new education hires on the way Smithsonian does Education programs and processes.
- The Desire for An Improved Customer Experience – A customer focused architecture will provide a consistent and improved customer experience resulting in increased value of the Smithsonian to its customers and stakeholders.
- The Need for Accurate Information – Capture of key business activities and information used to execute the education strategic objectives.
- The Need for a Consistent View of Business and Data
- The Need for Effective Sharing and Learning of Business Activities.
- The Need for Alignment of Resources to Support Key Activities Within the Business Area
- The Need for A Baseline For Continual Improvement

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:	TBD	

7.1.6 Segment Architecture: Pan-Institutional Calendaring/Event Management

a. Description

As part of its continuing focus on improving customer service through a more streamlined Web presence, Smithsonian has developed a segment architecture for the Pan-Institutional Calendaring/Event Management function. This function is aimed at providing functionality for each unit to define and share their current internal and external-facing events with the rest of the Institution and the public.

Although this function falls under the Support Services Line of Business, Public Affairs Business Area and Product Outreach Sub-Function, it integrates heavily with the on-going Mission Segment Architecture of Education by providing the vehicle by which customers can view the educational and public programs available. And while the current scope of this segment is Product Outreach, additional segments which may be added in the future include Program Registration and Program Evaluation. Both of which were identified as business needs during the education segment architecture stakeholder workshops recently conducted. Providing this additional functionality will enable customers to not only view the programs of the Smithsonian, but also register for them and provide follow-up evaluations so that Smithsonian may continuously improve its program offerings.

The Pan-Institutional Calendaring Segment involved the participation of 32 Smithsonian units over a six-month time period to identify the current processes, data and technologies in use at the Smithsonian and develop a target Business, Data, Service Component and high level Technical Architecture for segment.

"As is" Architecture

The current architecture describes the current ("as is") state of the agency in terms of performance, business, data, services, and technology. At a high-level this target architecture includes the following functionality:

- The main public Institutional Calendar is maintained by the Visitor Information and Associate's Reception Center (VIARC). However, there are currently over 15 separate web-accessible public event and program calendars in use at the Institution none of which is integrated with any other one. This often leads to many calendars which are not in sync and to frustration by visitors to the SI website wanting to attend events. There is a need for one central authority with up-to-date (up to the minute) information that visitors can count on with accurate event and venue information.

- Currently the majority of the units have a process which places the burden of publishing educational, public program and event offerings with the IT Web staff, instead of with the content creators. This often produces a bottle neck and makes last minute changes difficult for the one or two Web staff which most units have.

- Also, although VIARC is the authority for the Pan-Institutional calendar and is the public face for the Smithsonian at the main visitor center, VIARC staff do not always get event details or updates in a timely fashion. When changes do occur, only a small percentage of units notify VIARC electronically. The majority of last minute changes are handled through phone calls, emails or not communicated at all. This often leads to visitors receiving mixed signals between the main event schedule, unit event schedules and the visitor information center on the mall.

- In addition, there are a multitude of technologies in use at the Smithsonian to publish event information. Many of the technologies involve the use of static Web pages, which are cumbersome to maintain and require technical expertise.

"To be" Architecture

The target architecture describes the future ("to be") state of the agency in terms of performance, business, data, services, and technology. At a high-level this target architecture should include the following functionality:

- The target architecture for managing event information at the Smithsonian will place the contribution of event information in the hands of the business persons who manage that information and out of the hands of the Web IT staff. The process of creating event information will be distributed locally, but provide the ability to roll-up to the institutional level. Event workflow will be used for those units who require approvals before events can be published.

- Events will be categorized meaningfully by subject, audience and/or event type so that visitors can find what they are interested in easily. Having one central source of event information will eliminate the re-keying of event information and eliminate discrepancies in the information that is published. Updates to event information will occur in real-time so that calendars will not be out of sync and VIARC, the public face of the Smithsonian at the Reception center will always have the latest information to better serve their customers.

- Providing a Pan-institutional calendaring capability as a shared service will enable the Smithsonian to reduce duplicate systems and data as well as leverage its IT investments across the organization. In addition, reducing the duplicate systems will provide a more standardized technical environment and enables limited IT staff to be leveraged across the organization (instead of needing to hire expertise on a system by system basis).

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Segment Architecture Initiation	09/2007		09/2007
Complete Segment Architecture	12/2007		01/2008
Alternative Analysis	12/2007	02/2008	
Product Selection	06/2008		09/2008
Product Implementation	12/2008		03/2009

c. Benefits

The following benefits were identified and 80% of stakeholder respondents felt all four benefits were of high importance:

- Central authority for event information
- Timely dissemination of information
- Collecting related information and targeting specific audiences
- De-duplication of effort

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	TBD	

7.1.7 Segment Architecture: IT Management & Planning

a. Description

The Smithsonian is in the process of developing the Information Technology Management and Planning segment to include the Smithsonian's investments in IT Infrastructure, as well as, Enterprise Architecture and Planning. The overall vision is to provide a consolidated IT infrastructure which supports its internal and external customers. To this end, the Institution is committed to securing the resources needed to: (1) maintain and build upon the robust and mature IT infrastructure put in place over the past six years; (2) build a consolidated, secure IT infrastructure for Smithsonian digital assets (collections; scientific data) to fully support storage, preservation, and access by all internal and external stakeholders.

The challenge for this segment will be to establish enterprise-level mission support systems that will enable the Institution to transform and remix its collections and research data in ways yet to be imagined; and to provide the necessary tools to search and explore this vast repository of knowledge. The primary vehicle for disseminating this new wealth of knowledge will be the Web as it reaches beyond the physical limitations of our buildings in welcoming millions of visitors of varying ages, learning styles, first languages, and cultural backgrounds. The Web will form the conduit of public outreach and research exploration to delight, educate, stimulate, and allow each visitor to experience our collections and research in ways that are meaningful to them.

The Smithsonian is currently undertaking a year- long effort to develop a strategic plan to guide the efforts of the Smithsonian's management and staff. A key part of the strategic plan is to inform how Information Technology will enable the future strategic vision of the Smithsonian. An Enterprise Architecture approach will ensure that the key resources, business activities and information used to execute the strategic objectives are captured and that the resulting technologies are leveraged across the Institution. Smithsonian is developing an Information Technology Management and Planning segment architecture which will focus on providing shared services and an enterprise IT backbone for voice and data transmission.

"As is" Architecture

The heterogeneous nature of the Institution's information technology infrastructure in the past constrained its ability to rapidly infuse new technology to meet growing workload demands and provide responsive IT service. The Smithsonian has made significant progress to date towards implementing a managed IT infrastructure and improving IT services including:

- Server Consolidation
- Service Consolidation
  - VOIP
  - Help Desk
  - Mobile Technology
  - Desktop Replacement
  - Email/File Services
  - Enterprise Storage & Backup
  - Standard Configuration (Desktops and servers)
  - Virus Scanning
  - Remote Desktop Management
- Data Center Services
- Enterprise Security
- Web Infrastructure

Please refer to Chapter 6 for more details about the "as is" architecture.

"To be" Architecture

The target architecture describes the future ("to be") state of the agency in terms of performance, business, data, services, and technology. In addition to the infrastructure improvements made above, the Smithsonian will continue to move toward a consolidated IT Infrastructure and shared services model which takes into consideration cross agency initiatives as well as the needs of Smithsonian internal and external stakeholders.

The Smithsonian Information Technology Management segment has considered several cross-agency initiatives in the development of this segment including the IT Infrastructure LOB and the Federal Desktop Core Configuration. Smithsonian's participation in these initiatives, and in other relevant initiatives including E-Clearance and HSPD-12 is further described in Section *7.1.3 E-Government Initiatives*.

The Enterprise Architecture and Planning team conducted a SWOT analysis with the members of the ITMC to identify key opportunities, strengths, weaknesses and threats for the Smithsonian's IT Infrastructure going forward. The ITMC is made up of the IT Managers across the institution and will ultimately be the customers/benefactors of the target shared IT services and infrastructure.

Although, the "target architecture" of the Information Technology Management and Planning segment will be detailed as part of the Smithsonian EA Segment Reporting submission document, the following provides a summary of the initiatives which will move the Smithsonian from the "current as-is" architecture to the envisioned future state, with an eye towards adopting Software as a Service (SaaS) and open source software solutions when appropriate:

- Smithsonian Data Center & SInet
  - Consolidation of all applicable servers in the Smithsonian Data Center
  - Fully functional IPv6 environment
  - Tiered Storage
  - Centralized Archival Storage scaled to meet growing demands
  - Secure Wireless Network throughout Smithsonian Facilities
  - Network upgrades at STRI to support VoIP and Wireless technologies
  - Operational Forensics
  - Security Infrastructure Services that keep pace with emerging threats
  - Disaster Recovery Services for email
- VoIP & other Telecommunications
  - Extension of VoIP to STRI, NZP-CRC and SERC
  - Centralized Management of Video Conferencing
  - Desktop Video Conferencing
  - Mobile Technology/Wireless
- Centralized Services / Programs
  - Periodic Hardware Replacement
  - Periodic Server Replacement Program
  - Centralized Printer Management
  - Enterprise Electronic Records Management
- Digital Asset Infrastructure
  - Enterprise Digital Asset Management (DAM)
  - Enterprise Digital Asset Network
  - Curation of Scientific Data
- Web Shared Services
  - Continued Refinement of Google Search to support findability of content from SI websites
  - Social Networking/Web 2.0 enabling shared services
  - Internal Collaboration Environment
  - External Collaboration Environment (e.g., Sharepoint)
  - Web Shared Services (event calendaring, registration, ticketing, e-commerce, etc.)
  - Distance Learning

Please refer to Chapter 6 for more details about the "to be" architecture.

b. Major Milestones

Tasks/Products		Completion Date	
	Initial Projection	Current Projection	Actual
Smithsonian Data Center and SInet:			
Network router & switch upgrade @ STRI	03/2008		03/2008
Fiber Optic Cable, BCI to STRI	06/2008		06/2008
Secure Wireless Engineering & Initial Access Points	12/2008		12/2008
Secure Wireless Access Points (Full Coverage)	TBD		
Archival Storage Fully Operational	01/2009		
IPv6 Network backbone	06/2008		06/2008
IPv6 Server transition	12/2009		
IPv6 Workstation Transition	10/2010		
IPv6 Fully functional environment	02/2011		
Operational Forensics Routinely Used	TBD		
VoIP & Other Telecommunications			
VoIP @ Off-Mall Locations	05/2010		
Implement unified video conferencing			
Meeting Place Web Conferencing Integrated with Exchange and VoIP	06/2008		06/2008
Centralized Services & Programs			
Initiate Periodic HW Replacement-Desktops, Scientific Workstations Printers	08/2004		08/2004
Initiate Periodic HW Replacement-Switches & Routers	TBD		
Initiate Periodic HW Replacement-Network Servers	09/2008		09/2008
Centralized Printer Management	TBD		
Electronic Record Management	TBD		
Digital Asset Infrastructure			
Deploy Enterprise DAM	12/2009		
Enterprise Digital Asset Network	TBD		
Curation of Scientific Data	TBD		

Tasks/Products		Completion Date	
	Initial Projection	Current Projection	Actual
Web Shared Services			
Integrate new Google Search technology	12/2010		
Sharepoint, Internal Collaboration	05/2009		
Sharepoint, External Collaboration	TBD		
Event Calendaring Shared Services	04/2009		
Distance Learning	TBD		

c. Benefits

The IT infrastructure will add services, improve reliability, provide for growth supported by proven technology, integrate with the Internet Protocol (IP) communications architecture, and ultimately provide for an infrastructure to support voice, video, and data on a single platform.

Managing IT centrally will help to create a homogenous, standards-based IT infrastructure as the foundation for robust and scalable distributed systems and services that support applications throughout the Institution.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	Ongoing	

7.2 System Product Assurance

The Smithsonian Product Assurance (SPA) program establishes and administers programs for quality assurance, requirements management, and independent testing of application software and information technology infrastructure. This includes:

- Evaluation and recommendation of preferred products used for requirements management, configuration management, and testing for inclusion in the Smithsonian's Technical Reference Model;
- Support of information system development by developing and/or reviewing project's requirements management and configuration management process;
- Development and execution of test plans and libraries;
- Conducting independent tests of proposed information technology infrastructure enhancements;
- Support of system development life cycle management process definition and improvement.

Smithsonian product assurance staff work with project staff to tailor the project life cycle management (LCM) deliverables, reviews and events as permitted per TSG IT-920-01, *Life Cycle Management Manual*. This process identifies the minimum number of deliverables, reviews, and milestones for decision processes necessary for the automated information system (AIS) or infrastructure project to ensure delivery of a quality system on time and within cost.

Smithsonian system product assurance has two objectives:

- The first objective is to provide an independent technical assessment that can be used to determine whether an AIS or IT infrastructure component development or life-cycle-products delivered in a particular phase are complete enough to lower development risk to an acceptable level. If so, the next phase of the project can be started.

- The second objective is to identify specific errors and exceptions and to recommend development deliverables and process changes that can be made to avoid or minimize future impact and software errors.

The system development process and pre-delivery product assessment are practiced on a very limited basis because most, if not all, Smithsonian IT infrastructure and AIS projects consist of commercial-off-the-shelf (COTS) product integration and deployment as opposed to custom-developed code or specialized hardware design and fabrication. The product assurance process for a COTS implementation validates that the COTS product is configured appropriately, operates as advertised, and integration is working properly.

7.2.1 Independent Verification

The independent verification and validation (IV&V) function supports AIS and IT infrastructure system development, maintenance, testing, and operational activities. Specifically, independent verification reviews core system development life cycle deliverables to provide an independent engineering assessment of the completeness and accuracy of deliverables in each development phase to ensure that:

- Defined requirements are complete and testable;
- Interfaces and interface control between system elements are defined;
- System functional and physical components and their relationship to the overall system are defined;
- Requirements are allocated to system design and test cases and traceability is maintained;
- System configuration is defined in terms of physical and functional components that are delivered as defined.

System product assurance independent verification is an IT infrastructure function that supports unit and IT infrastructure system projects on an as-directed basis for critical, complex, and large projects. The SPA independent verification deliverable is a System Product Assurance (SPA) system development milestone assessment report. It is delivered at the close of a given life cycle milestone and includes an assessment of requirements, configuration management, and associated risks for each.

The benefits of system product assurance independent verification are:

- Reduced risks, costs, and adverse schedule impacts. Errors are detected and corrected as early as possible in the system life cycle.
- Increased customer satisfaction because system quality and integrity are improved.
- Defect analysis: lessons learned and common problems are tracked for future improvement.

7.2.2 Requirements Verification

Requirements verification ensures that requirements meet customer objectives and are sufficiently defined to support system development and/or acquisition. In the verification process, functional, data, interface, and performance requirements are analyzed for completeness, traceability, and testability.

- Completeness is assessed by reviewing the original requirements source and analyzing the requirements baseline to ensure that each high-level requirement, when decomposed and interpreted into system requirements, is fully satisfied by the lower-level requirements allocated and that a logical rationale is evident for the allocation.
- Requirements traceability analysis includes requirement-to-requirement allocation, requirement-to-design allocation, and requirement-to-test case allocation.
- Requirement testability analysis ensures that testers are provided with specific, testable requirements from which to develop test specifications and procedures.

Requirements verification results are provided in the form of a technical analysis report (TAR) that defines requirements completeness, traceability, and testability metrics. The reports also include specific recommendations, as well as impact and risk analysis. On those projects where it is performed, the SPA independent requirements verification will:

- Increase system effectiveness in satisfying user requirements for the project;
- Reduce rework cost by identifying issues in early phases of the development life cycle;
- Improve project management visibility.

7.2.3 Configuration Verification

Configuration verification will be completed for selected AIS and IT infrastructure projects based on scope, complexity, criticality, and funds availability. This kind of verification confirms that the functional and physical configuration is delivered as defined for a particular system. Configuration verification, which may occur at various system development milestones, but primarily at the point of final acceptance testing, is an indirect confirmation that the project configuration management function has been executed.

Configuration management may include software (applications, systems, commercial, test), hardware, and documentation. The goals of configuration management are traceability, accountability, maintainability, and the ability to replicate the system so that accurate materials are available for developers and complete systems are available for production use.

Configuration verification includes functional configuration audits (FCA) and physical configuration audits (PCA). The functional and physical configuration audits are reported in technical analysis reports along with the test results.

The benefits of configuration verification are:

- Increased customer satisfaction: greater reliability and availability of systems, as well as lower costs for help desk and trouble-shooting functions. Configuration verification ensures that wrong versions of hardware and software are not used for acceptance testing and not installed in production, which in turn reduces system failures that would directly affect users.

- Cost reduction: test time is reduced and error resolution simplified because spurious errors caused by configuration errors are minimized. Configuration verification also supports maintainability, impact analysis, and reuse;

- Process efficiency: common infrastructure and application software component baselines can be used to automate portions of defect analysis, impact analysis, and compatibility testing.

7.2.4 Independent Validation

System product assurance independent validation is testing that ensures the operational readiness of an AIS or IT infrastructure system. It is accomplished by testing the systems to verify that functional, data, interface, and performance requirements are correctly and completely implemented independently of the system developers.

Independent acceptance testing begins early in the life cycle to gather user requirements and design information necessary for planning testing and developing test documents, which may be reused for regression testing when the AIS system or IT infrastructure project is modified. Testers gain a thorough familiarity with the system to be tested as early as possible in the life cycle by monitoring and participating in developers' unit and integration testing and by inspecting selected development deliverables and documentation. End-user participation in the development of the acceptance test plan is essential to ensuring correct interpretation of user requirements, user commitment to the system, and user acceptance of the system.

Independent validation test activities include:

- Test Plan Development;
- Test Procedure Development;
- Test Execution;
- Test Analysis;
- Discrepancy Tracking.

Independent acceptance testing is a preventive function that ensures a system will function properly and attempts to find the bugs in a new or revised system prior to its deployment. This work starts early in the life cycle to ensure that program area requirements are satisfied by the way the system functions.

Benefits obtained from independent acceptance testing are:

- **Cost reduction:** Discrepancies detected before system deployment are less expensive to fix than those found late in the life cycle;

- **Increased customer satisfaction:** Greater reliability of the software produced contributes to an increase in customer satisfaction.

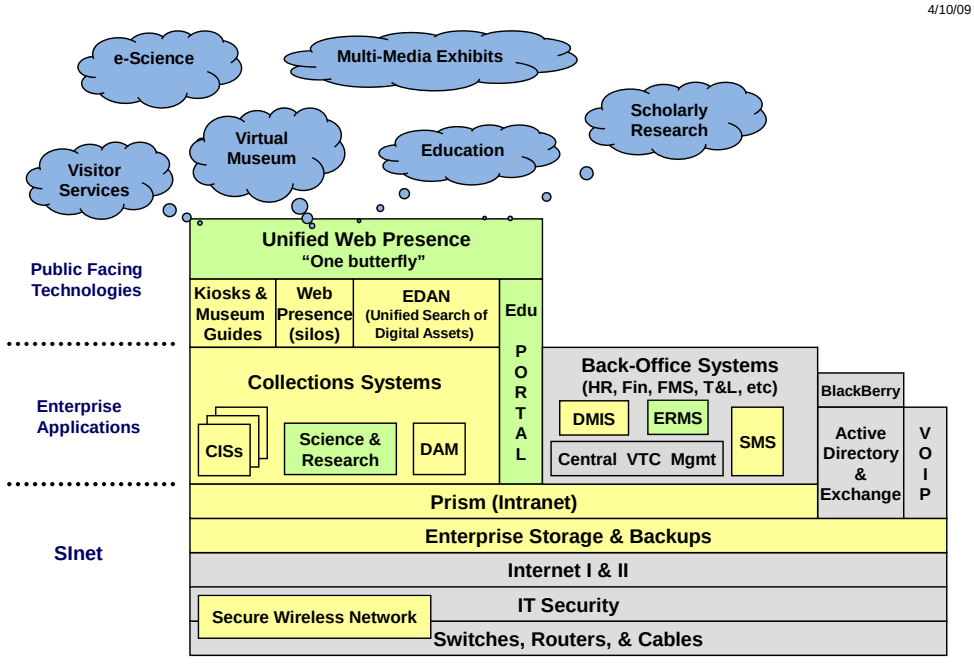
7.3 Engineering Services

Engineering Services encompasses a variety of study, analysis, design, and development efforts to support the evolution of automated information systems and the IT infrastructure. Engineering services are targeted to specific IT infrastructure or AIS projects. These include:

- Defining and analyzing requirements;
- Developing and/or evaluating system engineering and software design and architecture;
- Developing and testing engineering prototypes, pilots, and first-time production implementations of new technology infrastructure;
- Coordinating the integration of resulting systems into the production environment;
- Post-installation engineering support as needed.

Engineering services may:

- Make use of development and testing facilities and labs;
- Perform testing to ensure that application and infrastructure changes are compatible with existing hardware, software, and infrastructure;
- Provide architectural recommendations to upgrade, replace, or augment data center equipment and software.



Smithsonian's Enterprise IT Environment

7.3.1 AIS Engineering Services

a. Description

Automated Information System (AIS) engineering services are called upon to evaluate new hardware and software products, to design and develop system prototypes and pilots, and integrate new systems within the existing enterprise architecture. These services ensure that the Smithsonian implements emerging technologies as warranted to meet increasing demands and associated processing capabilities, and to provide a secure and highly reliable infrastructure platform at the Institution. To the degree practical, AIS engineering services are performed primarily in development environments that simulate the Smithsonian production environment.

Many AIS engineering services are in the form of unplanned architecture analysis and recommendations to solve specific AIS performance or capacity problems. An example of major AIS engineering services are the requirements and design tasks for the overall IT architecture of the National Museum of the American Indian. It defines and integrates collections information and media asset management systems with its Web infrastructure.

Often a first step in AIS engineering services is the formation of a Technology Working Group. The Technology Working Group (TWG) process includes and leverages IT technical staff across the Institution in the selection of technology standards and products. The goals of each TWG are to develop and provide technical expertise and to provide technical recommendations for specific services, standards, and products for incorporation into the Technical Reference Model. When full TWGs are not warranted, a streamlined Architecture Assessment and Recommendation process is used. Both of these approaches represent industry best practices and assure internal customer focus in the overall product selection.

AIS engineering services support all IT infrastructure projects, enabling the Smithsonian to maintain current business unit functionality, improve the quality of service, enhance current IT systems, and migrate enterprise AISs. They also benefit customers and staff by enabling staff to perform daily activities more effectively by deploying more capable, higher performing, and up-to-date technology and more efficiently by planning timely engineering and testing of alternatives to outdated technology.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
ACM *TMS* implementation	11/2005		11/2005
Design & prototype ArtCIS co-location infrastructure, Phase 3	09/2004		09/2006
SAAM Luce Foundation visible storage infrastructure integration Phase 3	09/2004		09/2006

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Geographic Information System (GIS) HLA	03/2004		03/2004
SETIS Requirements Defined & Documented	02/2005		02/2005
SETIS HLA	08/2005		08/2005
Enterprise Storage HLA	08/2006		08/2006
SITES TRAX System	12/2006		02/2008
Centralized Video & Web Conferencing Management	04/2008		06/2008
Digital Asset Management System (DAMS)	12/2006	12/2009	
CWAS	12/2008	06/2009	
Enterprise Tiered Storage Architecture	07/2009		
Secure Wireless	12/2008	12/2009	
SharePoint	12/2009	05/2009	
IPv6	02/2011		

7.3.2 Internet Protocol Version 6 (IPv6)

a. Description

When Internet Protocol version 4 (IPv4) was designed, engineers did not imagine the explosive growth in networked communications that would subsequently take place. This growth, driven largely by the Internet world wide Web has highlighted a number of deficiencies in IPv4, particularly around the areas of security, the number and availability of usable addresses, and the failure to natively accommodate roaming devices. In response to these shortcomings, the Internet Engineering Task Force (IETF) developed Internet Protocol version 6 (IPv6). In order to push development and use of IPv6, OMB mandated that Federal Government networks or agencies' backbones be IPv6 ready by 2008. The compliance of the server and workstations will be implemented in the following years.

The Smithsonian's IT infrastructure had been reliant on IPv4 which is used by the majority of public and private networks, and the Internet as a whole. In order to migrate to from IPv4 to IPv6, the Smithsonian depends on the hardware and software vendor community to produce products that are IPv6 compliant.

Device	IPv6 Compliancy	Comments
Apple OS X	Yes / Partial	Apple OS X supports IPv6 beginning with version 10.2. Most of the Institution's Apple Macintosh workstations are older hardware and use earlier versions of the Macintosh OS and cannot be upgraded to accommodate IPv6 until the hardware is upgraded
Cisco switches & routers	Yes	Cisco's switches and routers, installed at the Smithsonian, are IPv6 compliant. Cisco is working to resolve the few remaining IPv6 issues on some models.
Cisco Voice over Internet Protocol (VoIP) telephone system	Yes with restrictions	The current Cisco VoIP Call Manager and Voicemail do not support IPv6 and a future upgrade is needed.
Enterprise Mail System (Postfix)	Yes	
Lucent Vital QIP	No	The Smithsonian uses Lucent Vital QIP to provide DNS and DHCP services. The current version of QIP is IPv6 compliant, but currently not in use at the Smithsonian.
Microsoft Windows XP	Yes	Microsoft Windows XP with SP1 or 2, or embedded SP1 supports IPv6. Windows 2000 supports IPv6 when patched.
Microsoft Windows Server 2003	Yes	Microsoft Windows Server 2003 supports IPv6. Windows 2000 supports IPv6 when patched. The Smithsonian converted all previous Windows NT servers to either Windows Server 2000 or Windows Server 2003.
Sun Solaris	Yes	Sun Solaris 9 supports IPv6. Sun Solaris 8 supports IPv6.

Performance objectives for the Smithsonian's IPv6 transition program include:

- Demonstrated security of network operations, integration of IPsec, and integration of firewalls and intrusion detection systems;
- Demonstrated end-to-end operability in a mixed IPv4 and IPv6 environment;
- Verified network performance equivalent or better than the IPv4 based network;
- Demonstrated data, voice and video integration;

- Demonstrated scalability of the IPv6 network;
- Demonstrated support of mobile terminals (voice, data, and video);
- Demonstrated network management ability equivalent or better than the current IPv4 based network.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Obtain IPv6 address space	04/2005		02/2005
Modify acquisition documentation to require that all new hardware & software purchases be IPv6 compliant	01/2006		01/2006
Complete IPv6 Transition Plan	02/2006		02/2006
Identify all IP compliant devices & technologies	08/2005	06/2006	06/2006
Complete the fiscal & operational impact analysis	08/2005	06/2006	06/2006
Set up an initial IPv6 test environment for IPv6 routing & switching testing, and complete development of related test plans	08/2005	06/2006	01/2007
Order additional hardware & software for lab testing, as required	09/2006		11/2007
Install & configure lab equipment	12/2006		01/2007
Conduct initial lab testing for IPv6 transition	03/2007		05/2007
Develop preliminary identification of transition methodology based on lab test results	03/2007		03/2007
Update IPv6 Transition Plan	05/2007		05/2007
Update IPv6 Test Plan and Test Report	01/2008		01/2008
Finalize IPv6 transition methodology based on test results & industry lessons learned	12/2007		06/2008
Develop staff training requirements for IPv6 transition	01/2008		02/2008
Develop new addressing scheme for backbone transition devices	02/2008		05/2007
Conduct staff training for IPv6 backbone transition	05/2008		08/2007
Modify SInet to provide dual stack capability for the network backbone	09/2006		06/2008

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Server Transition			
Identify lab hardware & software requirements for server transition to IPv6 and order additional equipment as necessary	08/2008		03/2008
Develop lab testing requirements for server transition	08/2008		05/2008
Conduct lab testing for server transition	10/2008		06/2008
Finalize server transition methodology for IPv6 transition	03/2009		
Conduct staff training required for server transition	03/2009		
Transition the server environment to a complete IPv6 environment	07/2009	12/2009	
Workstation Transition			
Develop training plan for workstation transition to IPv6	02/2010		
Identify lab hardware & software requirements for workstation transition to IPv6, and order additional equipment as necessary	03/2010		
Develop lab testing requirements for workstation transition	04/2010		
Conduct lab testing for workstation transition	05/2010		
Finalize workstation transition methodology for IPv6 transition	08/2010		
Conduct staff training required for workstation transition	08/2010		
Transition the workstation environment to a complete IPv6 environment	05/2010	10/2010	
A fully functional IPv6 environment (after removing any remaining IPv4 support devices)	09/2010	02/2011	

c. Benefits

The IPv6 project is an IT infrastructure function to support all units, as well as essential infrastructure services. It benefits Smithsonian program areas by providing:

- A greater number of addresses, 340 undecillion (3.4 x 1038 possible addresses), verses a maximum of approximately 4 billion possible addresses with the currently used IPv4. With the new expanse of addresses, the Smithsonian can rethink the way in which they are

assigned in order to better track devices in an individual's possession, and to push down rights and permissions to an entire class of devices (workstations, PDAs, cell phones) under the purview of that individual.

- Potentially greater standard security due to authentication headers and encapsulating security headers that provide for both the integrity and confidentiality of IPv6 data grams.

- Greater mobility for IP devices through new concepts such as Stateless Address Auto Configuration which enables a host to automatically learn the interface address of an IP device thereby essentially operating in a plug-and-play mode with a resulting reduction in the information that a client device need to maintain.

- Beneficial joint Smithsonian/Asian and Smithsonian/European research activity opportunities due to many European and Asian organizations advancing towards IPv6 native environments.

- Enabling technology to allow the pursuit of additional resource generating services to the general public via the Internet by Smithsonian Enterprises.

- Potential improvements to the overall museum experience for the general public through the use of wireless information devices.

d. Status @ a Glance

Funding Status (FY09):	Fully Funded X Partially Funded Not Funded
Production Date:	*2009 (servers)* *2010 (workstations)*
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Systems Supported:	• SI-wide

7.3.3 Common Wireless Access System (CWAS)

a. Description

A Common Wireless Access System (CWAS) is to be installed in all of the Smithsonian's Washington DC museums located on the National Mall. The CWAS is a distributed antenna system that will be owned by the Institution with the primary purpose of providing cellular telephone coverage. It will be a vendor-independent system shared by the local cellular telephone carriers (Verizon Wireless, Sprint / Nextel, and AT&T) who have voluntarily agreed to participate...It can also be used by the Institution to provide several localized WiFi (wireless Internet) hotspots in and around Smithsonian museums.

Once in production, any existing ad-hoc in-building cellular antenna systems will be decommissioned when the CWAS is enabled.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Present CWAS concept to ODS & COO, OGR	11/2005		11/2005
Publish solicitation	12/2005		12/2005
Award a contract	03/2006		05/2006
Implement Pre-CWAS Public Wi-Fi Hotspot at SI Castle	07/2006		07/2006
Implement Pre-CWAS Public Wi-Fi Hotspot at SI HMSG and NMAI	11/2006		11/2006
Conceptual Design	07/2006		07/2006
35% Design Review	11/2006		07/2007
95% Design Review	TBD		03/2008
Operational @ NASM	12/2008		12/2008
Operational @ NMAI	12/2008		12/2008
Operational @ NMAH	02/3009		
Operational @ FSG	03/3009		
Operational @ Quad	03/2009		
Operational @ NMNH	05/2009		
Operational @ HSG	06/2009		
Operational @ Castle	TBD		

c. Benefits

The Common Wireless Access System will provide for all Smithsonian museums located on the National Mall:

- In-building cellular telephone coverage for all local cellular providers.
- Indoor WiFi hotspots in museum cafeterias, the Kogard Courtyard of the Reynolds Center, and some auditoriums and conference rooms;
- Outdoor WiFi hotspots in a number of locations adjacent to the museums and the Castle.

The intent is for the CWAS to be self-funded and possibly provide some limited revenue to the Smithsonian Institution.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2009	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Systems Supported:	•	SI-wide

7.3.4 Secure Wireless Infrastructure Design & Development

a. Description

The advent of wireless technology has ushered in new capabilities for rapidly deploying applications and services that previously were unavailable or not cost effective. This is especially true in areas such as multi-media guides and other hand-held devices. Smithsonian museums are adopting this technology to complement the world-class exhibitions for which they are known. Hand-held and interactive museum guides require access to content that must be updated and maintained. Wireless connectivity in this setting means that at some point Smithsonian resources made available to the public are at risk.

Another area of interest for wireless applications is collections management which with other research-related endeavors can greatly benefit from the ability to use mobile devices and applications. Now the scientist or curator can record collections data while working directly with the material or while being mobile.

Wireless also presents its own set of issues and problems that must be addressed, in particular those related to security. The wireless security infrastructure design and development project will create an enterprise architecture for the support and deployment of secure wireless technology. The key issue is how to allow devices to connect to a wireless infrastructure at multiple points while only allowing access to resources consistent with the authentication of the particular user.

One of the key methods that will be looked at is user/device level authentication. Through this technique, a user is limited to a quarantined or public network appropriate for type and location of their device until they can be authenticated as a valid user who is running approved and up-to-date systems. The user then will be allowed to connect to the appropriate resources.

The first phase focused on the architecture of the integration of the wireless networks into the existing SInet infrastructure by creating standardized configurations for access points and devices, as well as port-level access components that enforce a set of security rules for connections between the Smithsonian and other Internet sites.

The second phase included detailed architectural and engineering design, testing, prototyping and deployment planning. This was accomplished by creating smooth communication, authentication and registration process among all the access points, wireless LAN controllers, wireless security devices and management tools in a lab environment; building a wireless LAN prototype and testing it in an operation environment with proper authentication with the Smithsonian's existing active directory; securing this wireless LAN with WLAN NAC appliance and proper IDS/IPS systems.

The third phase was initiated in FY 2008 and includes unit-by-unit deployment and reengineering. This phase includes scheduled real-life deployment for each unit. Due to some different requirements with each unit, the generic design may need modification, so appropriate modification and reengineering will be required. For example, the National Zoo required a redesign to accommodate external access points.

In FY 2008, 175 access points were deployed across the Institution. In FY 2009, 60 additional access points are projected to be installed. The number of access points deployed each year is dependent on "as available" funding. Many units require additional access points which will be deployed in the future as funds permit.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Phase 1: Design wireless security infrastructure high-level architecture	09/2005		07/2007
Phase 2:			
Design and test user/device port-level authentication method	09/2005		01/2008
Design & develop enterprise user/device port-level authentication	09/2006		12/2008
Phase 3: Deploy SI-wide port-level authentication	09/2006	12/2009	
Transition support to full-time production support staff	09/2009		

c. Benefits

The wireless security infrastructure design and development project is an IT infrastructure function that supports all units, as well as essential museum and visitor services. It benefits Smithsonian program areas by:

- Protecting the assets and reputation of Smithsonian business units;
- Supporting secure electronic commerce transactions initiated by customers;
- Improving the performance and reliability of wireless connections;
- Improving management and auditing of all connections—wired and wireless—to the Smithsonian network.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2008	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

7.3.5 SharePoint

a. Description

Sharepoint is a collaboration and document management tool that can help individuals and teams work together and share information through a common online portal. Windows SharePoint Services (WSS) will be piloted to learn best how the technology can be applied at the Smithsonian. Once the pilot phase is concluded, the technology will be evaluated to determine if an enterprise version of SharePoint (MOSS 2007) with its enhanced features will benefit the Smithsonian. SharePoint:

- Allows individuals and teams to be productive with easy to use web-enabled tools for reviewing, editing and commenting on documents and proposals.
- Provides a common interface for sharing information and ideas and serves as a medium for distributing information.
- Produces dynamic sites that can be customized to meet user needs.

The Smithsonian Institution migrated to a common directory (Microsoft Active Directory) for accounts, groups and passwords. SharePoint will integrate and utilize this directory for authentication and security controls. SharePoint integrates with Office 2003 and Office 2007; so information and resources do not need to be replicated.

A number of Smithsonian museums and departments have shown interest in using SharePoint services. Early candidates include converting the Smithsonian's Intranet (Prism) to a Sharepoint hosted environment, and as a collaborative space for Smithsonian committees and ultimately with external colleagues. At the Smithsonian, a collaborative and document management tool will need to be implemented to operate smoothly in a heterogeneous environment of Windows and Apple computers, and will benefit from the IT infrastructure moving towards a homogenous environment for file, print, and email services.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
WSS Pilot:			
Project Plan	11/2007		11/2007
Requirements Definition	11/2007		11/2007
High Level Architecture	11/2007		11/2007
TRB Review	11//2007		11/2007
System Design Document	01/2008		02/2008

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
TRB System Design	01/2008		02/2008
System Testing	03/2008		03/2008
Production Readiness Review	03/2008		03/2008
Operational	12/2009		04/2008
Moss 2007 Enterprise Implementation			
Pilot Review and lessons learned	11/2008		11/2008
Project Plan	2/2009		
Requirements and HLA Review	2/2009		
System Design Review	3/2009		
System testing and Prototype Review	4/2009		
MOSS 2007 upgrade	4/2009		
Migrate content from old WSS environment	5/2009		
System Operational	5/2009		

c. Benefits

SharePoint allows users to be more productive when working together on documents, tasks, contacts, events, and other information. SharePoint services will provide document library services, team site capabilities for authoring, managing and collaborating on documents and will serve as a common repository for business documents—in ways that will go well beyond today's email and file sharing.

The use of SharePoint will allow for common standards for site provisioning and management; and can be leverage to create a central infrastructure. For instance, if many Smithsonian units choose to replace their internal Prism websites with SharePoint, a by-product will be a more common look-and-feel among these internal websites resulting in a better integrated Prism for staff across the Institution.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:		2008 (WSS version) *2009 (Moss 2007 version)*
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Systems Supported:	•	SI-wide

7.3.6 Enterprise Tiered Storage Architecture

a. Description

Enterprise storage architecture complements and adds to the considerable and growing Smithsonian institution's core digital infrastructure. A fully implemented enterprise storage infrastructure will provide individual units and offices with timely storage for unimpeded digital content growth, and reliable and secured services that guarantee the safekeeping of these assets.

The 2006 Enterprise Storage Architecture study defined goals that fell in line with the overall Institution Performance Objectives:

- Address the current digital asset storage processes, issues and challenges
- Define a “standard” process and policies for data storage to the degree possible – to include data storage for public facing, online, near-line, offline and archive digital data
- Define a methodology for projecting current data storage needs and future growth trends
- Define the strategy that best supports new storage process

Since 2006, the Smithsonian has made some progress in enhancing its enterprise storage and in FY2009 will have in place a fully operational tiered storage of: online, near-line, and offline storage. A complete storage architecture must also include appropriately scaled back-up solutions. In addition, the complete storage architecture will also include architecting Information Lifecycle Management (ILM) to manage online, near-line, and offline storage. The ILM will provide Service Level Agreements (SLA) between users (SI business units) and service provider (OCIO) for a common understanding of data/information retention policy.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Enterprise Storage TWG	03/2006		08/2006
Enterprise Storage HLA	03/2006		08/2006
Enterprise Storage Recommendation	08/2006		08/2006
Acquisition of near-line storage (Centera Archiving Storage)	07/2007		07/2007
Integrate Centera Archiving Storage with MS Outlook	03/2008		03/2008
Integrate Centera Archiving Storage with Digital Asset Management (DAM)	02/2009		
Virtual Tape Library Backup Solution	08/2007		
ILM Architecture	07/2009		

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Storage Virtualization Architecture	03/2010		
Cloud Storage for Internet facing data	TBD		

c. Benefits

Replacing the current storage consisting of storage acquired and maintained by units with a robust-tiered storage architecture that will safeguard the Smithsonian's digital content, and lead to uniformly applying data storage practices, policies, and better planning for future growth.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2000s	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Systems Supported:	•	SI-wide

7.3.7 Centralized Video Conferencing

a. Description

Centralized Video Conferencing provides a centrally supported video conferencing standards for all individual units at Smithsonian purchasing equipment in a coordinated fashion. Centralized Video Conferencing infrastructure includes conference scheduling, remote administration, advanced troubleshooting and high-definition (HD) video capabilities across Smithsonian. It ensures Interoperability among current video conferencing systems at Smithsonian, and studies the feasibility of purchasing and installing a centrally managed multimedia server for voice, video and Web conferencing.

The objectives of the Centralized Video Conferencing are:

- Create a unified video conferencing environment across the entire Smithsonian
- Reduce the cost for video conferencing across the Smithsonian
- Establish preferred vendor lists for video conferencing equipment by studying current market trends
- Honor the boundaries of conferencing sessions, establishing a better security environment
- Ensure non-interruption of network services while video conferencing sessions share network bandwidth with other uses

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Video Conferencing			
Installation, Configuration and Testing	11/2007		12/2007
Admin and scheduling process	11/2007		12/2007
Video Conferencing Pilot	02/2008		05/2008
As-Built System Documentation	03/2008		05/2008
Roll out to Production	04/2008		06/2008
Web Conferencing			
Installation, Configuration and Testing	12/2007		01/2008
Admin and scheduling process	12/2007		01/2008
Web Conferencing Pilot	02/2008		05/2008
As-Built System Documentation	03/2008		05/2008
Roll out to Production	04/2008		06/2008
Microsoft Exchange and conference room scheduling integration	TBD		
VoIP Call Manager and MeetingPlace Audio server integration	TBD		

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
MeetingPlace Audio, Video and Web administration	TBD		

c. Benefits

The video conferencing at Smithsonian was previously operated on an individual unit level using point-to-point protocols thereby restricting the number of participants.

A centrally integrated and managed environment fosters better integration of conference scheduling services across units, making equipment interoperable, better support for emerging technologies, easier administration, and better and faster troubleshooting.

d. Status @ a Glance

Funding Status (FY09):	X	Fully Funded Partially Funded Not Funded
Production Date:	2008	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Systems Supported:	•	SI-wide

7.3.8 Operational Forensics

a. Description

Operational forensics is the application of analysis techniques to identify the occurrence, trends, and underlying causes of observed computer-based events—most notably aberrant performance issues and system faults. By taking longitudinal views of operational data (such as log data), OCIO hopes to identify normal and aberrant conditions, and proactively support the assets of the Institution.

To support this initiative, OCIO has acquired and deployed at the Smithsonian's Data Center in Herndon Splunk, an industry-leading application for log aggregation, archiving and search. By using Splunk, our IT administrative staff can search and study IT data from applications, servers and network devices in real-time. Logs, configuration files, messages, traps and alerts can all be instrumented via the product, and it's our intention to establish this as a core tool and expand it over time.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Deploy Splunk Initially	12/2008		12/2008
Staff training	01/2009		01/2009
Tune Splunk	01/2009		01/2009
Tune – Solaris, F5, Oracle, etc.	03/2009		

c. Benefits

Splunk improves the availability of applications, servers, networks and email while reducing operational cost and meeting compliance objectives. We expect this investment to deliver return on investment in four key areas: availability, security, cost and compliance.

- It enables availability by drastically reducing incident response times and enabling administrators to see problems before failures occur.

- It improves security by making it easier and faster to detect and investigate security issues, and reinforces a "separation of duties" model where auditors and investigators can assess activities and monitor changes without the involvement of system administrators.

- It meets compliance requirements by providing user and activity tracking, change and policy control, and log data archiving and reporting.

- It reduces operational costs by cutting the time spent for routine investigations, reducing the number of incidents by tracing true root cause the first time, and avoiding group analysis.

d. Status @ a Glance

Funding Status (FY09):		Fully Funded
	X	Partially Funded
		Not Funded
Production Date:	2009	
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Systems Supported:	•	SI-wide

A-1 Interfaces between Smithsonian Systems

System	Interfaces with…	Description of Interface
PAYES	ERP Financials	The PAYES system processes payroll data provided by the National Finance Center and generates accounting entries for posting to the ERP Financials system. The PAYES system produces files containing the generated accounting entries that are loaded into the ERP Financials system via an interface and processed.
SIRIS	ERP Financials	The SIRIS system interfaces with the ERP Financials purchasing and accounts payable modules to create purchase orders and vouchers within the ERP system for book and periodical orders created in the SIRIS system.
FMS	ERP Financials	The ERP Financials system sends purchase order and GL journal information to the FMS system for documents related to FMS work orders. FMS uses the information sent from the ERP Financials system to update work orders with cost information from purchase orders and reimbursement information from journals.
FMS	ERP HRMS	The ERP HR system sends two levels of employee information to the FMS system for use with the FMS work management system: (1) General employee information e.g., name, organization and job title is sent for all SI staff; (2) Specific information on OFEO employees is sent to facilitate processing of time and labor information associated with the work management system.
EMS	ERP Financials	The Endowment Management System (EMS) interfaces with the ERP Financials System to load budget amounts for endowment payouts on an annual basis, and on a monthly basis to load endowment activity into the general ledger.

System	Interfaces with…	Description of Interface
SAO Legacy Financial system	ERP Financials	The SAO legacy financial system interfaces with the ERP Financials System to load and process accounting entries for the distribution of payroll expenses for SAO staff and central engineering.
ERP HRMS	Medgate HRMS	The ERP HRMS provides employee information to the Health and Safety Medgate Module to provide the base data for recording clinic visits, monitoring, injury or illnesses and support statistical reporting.
STARS	ERP HRMS	The ERP HRMS system has a bidirectional interface with STARS. Recruitment information for vacancies from ERP HRMS is sent to STARS. Once the vacancy is closed, key information regarding the selected candidate is transferred into ERP HRMS to set-up the hire.

A-2 Interfaces with Non-Smithsonian Systems

System	Interfaces with…	Description of Interface
ERP HRMS	NFC Payroll/Personnel System	The ERP HRMS system has a bidirectional interface with the NFC Payroll/Personnel System. Actions originating from the ERP HRMS system such as personnel actions, data changes, and benefit changes transmitted to NFC via the NFC front-end system interface.
ERP HRMS (AIRS)	OPM EHRI	The ERP HRMS system sends federal employee training data to the Office of Personnel Management's enterprise Human Resources Integration (e-HRI) system. The National Finance Center provides other employee data to the e-HRI system.
ERP HRMS	DOL Workers Comp	The ERP HRMS system will send worker compensation CA1 claims to DOL in electronic format and receive status and updates from Department of Labor (DOL).
ERP Financials	U.S. Treasury	The ERP Financials System interfaces with U.S. Treasury systems for disbursements of vendor and travel payments via Electronic Funds Transfer and Treasury Check.
ERP Financials	Bank of America	The ERP Financials system utilizes files, provided by the Bank of America in a standard Bank Administration Institute (BAI) format, to support automated account reconciliation for disbursements made from Smithsonian accounts.
ERP Financials	JP Morgan Chase	The ERP Financials system interfaces with JP Morgan Chase to load purchase card transactions for review, approval, and redistribution to appropriate chart fields by Smithsonian cardholders.
ERP Financials	Citibank	The ERP Financials system interfaces with Citibank to load purchase card transactions for review, approval, and redistribution to appropriate ChartFields by SI cardholders.

System	Interfaces with…	Description of Interface
ERP Financials	National Finance Center	The ERP Financials system interfaces with the National Finance Center to update vendor file entries for employees. The updates include adding entries for new employees, and changes to employee address and banking information.
ERP Financials	STRI Payroll	The ERP Financials system provides an interface to load accounting entries generated by the payroll provider servicing employees of the Smithsonian Tropical Research Institute (STRI) in Panama that are Panamanian citizens. The accounting entries are loaded via the interface and processed within the ERP Financials system.
ERP Financials	GSA FPDS-NG	The Complex Acquisition and Contracting System (CACS) module of the ERP Financials system interfaces with the GSA Federal Procurement Data System – Next Generation (FPDS-NG) system to automate the submission of data for individual contract actions to GSA.
ERP Financials	Northrop Grumman - GovTrip	ERP Financials accepts travel authorization transactions from the GovTrip system and uses them to create and update purchase orders in Accounts Payable. ERP sends Advice of Payment transactions to GovTrip to report advance payments and travel voucher reimbursements.
STARS	USAJobs	In USAJobs, applicants create a user id, setup their resumes, and search for vacancy announcements. If the applicant chooses to apply to a Smithsonian vacancy, they are transferred to STARS where they respond to questions and submit one of their resumes stored on USAJobs.

APPENDIX B: ACRONYMS

AAA	Archives of American Art
ACM	Anacostia Community Museum
AP	Accessibility Program
APAP	Asian Pacific American Program
AV	Central Audiovisual Branch, OFEO
CAORC	Council of American Overseas Research Centers
CEROS	Center for Electronic Research & Outreach Services
CFCH	Center for Folklife & Cultural Heritage
CHNDM	Cooper-Hewitt, National Design Museum
FSGA	Freer/Sackler Galleries of Art (Combined Organizational Unit)
GVP	Global Volcanism Program
MBC	Migratory Bird Center
MCI	Smithsonian Museum Conservation Institute
MOD	Mail Order Division (*see* SI Catalogue)
MSRL	Museum Studies & Reference Library
NMAAHC	National Museum of African American History & Culture
NMAH	National Museum of American History, Behring Center
NMAI	National Museum of the American Indian
NPG	National Portrait Gallery
NSRC	National Science Resources Center
NZP	National Zoological Park
OC	Office of the Comptroller
OCFO	Office of the Chief Financial Officer
OCIO	Office of the Chief Information Officer
OCon	Office of Contracting
OD	Office of Development
OEA	Office of External Affairs
OEC	Office of Exhibits Central
OEDC	Office of Engineering, Design & Construction
OEEMA	Office of Equal Employment & Minority Affairs

OFEO	Office of Facilities Engineering and Operations
OFMR	Office of Facilities Management & Reliability
OGC	Office of the General Counsel
OGR	Office of Government Relations
OHR	Office of Human Resources
OI	Office of Investments
OIG	Office of The Inspector General
OIR	Office of International Relations
OITO	Office of Information Technology Operations (OCIO)
ONP	Office of National Programs
OP&A	Office of Policy and Analysis
OPA	Office of Public Affairs
OPPM	Office of Planning & Project Management
OPMB	Office of Planning, Management & Budget
OPS	Office of Protection Services
ORTS	Office of Research Training and Services (formerly Office of Fellowships)
OS	Office of The Secretary
OSHEM	Office of Safety, Health and Environmental Management
OSEP	Office of Special Events & Protocol
OSM	Office of Systems Modernization (OCIO)
OSP	Office of Sponsored Projects
OT	Office of the Treasurer
OUSA	Office of the Under Secretary for Art
OUSS	Office of the Under Secretary for Science
PDL	Product Development & Licensing
RG	Renwick Gallery (Organizational abbreviation)
S MAG	*Smithsonian* Magazine
SA	Smithsonian Affiliations
SAAM	Smithsonian American Art Museum
SAO	Smithsonian Astrophysical Observatory
SAPA	System Architecture & Product Assurance (OCIO)
SCEMS	Smithsonian Center for Education and Museum Studies
SE	Smithsonian Enterprises (formerly Smithsonian Business Ventures)
SEEC	Smithsonian Early Enrichment Center
SERC	Smithsonian Environmental Research Center

SI	The Smithsonian Institution
SI CAT	Smithsonian Catalogue, Smithsonian Retail, 750 9th St, NW, 7th Fl
SIA	Smithsonian Institution Archives
SIL	Smithsonian Institution Libraries
SILRA	SIL Research Annex
SISP	Smithsonian Scholarly Press
SITES	Smithsonian Institution Traveling Exhibition Service
SLC	Smithsonian Latino Center
SMSFP	Smithsonian Marine Station at Fort Pierce, Ft Pierce, FL 34949
SMS	Smithsonian Museum Stores
TSA	The Smithsonian Associates
TPPPM	Technical Plans, Policies & Project Management (OCIO)
USS	Under Secretary for Science
VIARC	Visitor Information & Associates' Reception Center