



Smithsonian Institution Information Technology Plan

FY 2012 to FY 2016

Office of the Chief Information Officer

Smithsonian Information Technology Plan

FY 2012-FY 2016

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CHAPTER 1 Plan OVERVIEW

1.1 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. The *Smithsonian Information Technology Plan* (SITP) documents the role that information technology (IT) plays in fulfilling that mission, as well as goals and objectives defined in the Institution's FY 2012 to FY 2016 strategic plan.

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. This plan then informs the SITP Strategic Overview which is published separately as a companion to this document.

1.2 Governing Strategies

The Chief Information Officer has developed five 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 strategies.

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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 lifecycle 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 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 processes 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.

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- 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 (HIPS) and Detection (HIDS) 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.

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- 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.

1.3 Plan Organization

This plan aligns the Smithsonian's IT systems under one of the six strategic priorities of the Institution where there is a best fit. This is somewhat subjective in that many systems support one or more of the Institution's strategic priorities. Each strategic priority is given its own chapter: Chapters 3 through 8: Strengthening Collections, Excellent Research, Broadening Access, Crossing Boundaries, Revitalizing Education, and Organizational Excellence. It should be noted that due to its nature as an information technology plan, the IT infrastructure and Enterprise IT Security Program have each been given their own chapters even though both of these fall under the Smithsonian's strategic priority for Organizational Excellence.

Initiatives in each strategic priority area are also mapped to the Federal Enterprise Architecture (FEA) line of business and sub-functions referenced per the *FEA Business Reference Model*. Chapter 2 describes the enterprise architecture approach and major EA initiatives.

The companion document, the SITP Strategic Overview, is published separately and 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.

Both documents are available from the Smithsonian's public-facing website at <http://www.si.edu/ocio/>.

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CHAPTER 2 ENTERPRISE ARCHITECTURE & PLANNING

2.1 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)

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2.1.1 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.

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b. 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:

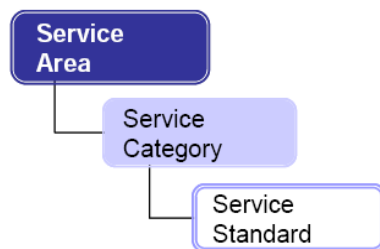
- Defining and documenting the current IT environment in order to support technical and financial planning;
- Promoting IT interoperability among all automated information systems through a shared vision of the Smithsonian-wide enterprise architecture;
- Reducing duplicate design, engineering, development, 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.

2.1.2 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.

2.1.2.1 Technical Reference Model

The mechanism used to define and govern the enterprise technical architecture is the Technical Reference Model (TRM).



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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.

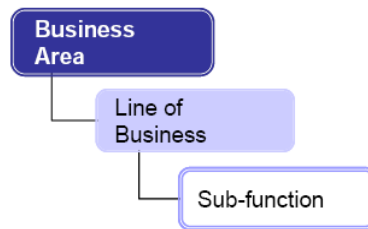
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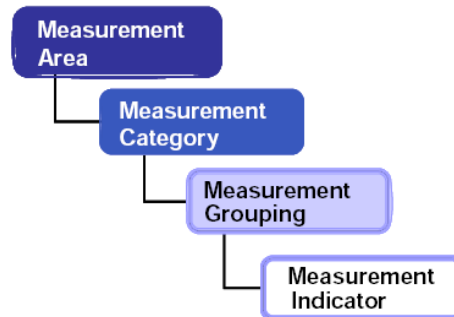
2.1.2.2 *Business Reference Model*

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.



2.1.2.3 *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.

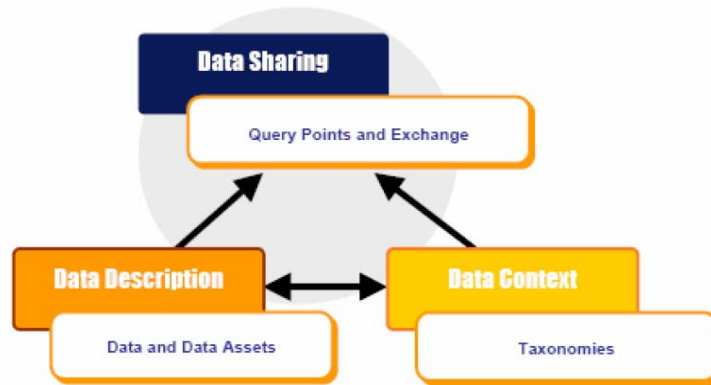
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2.1.2.4 Data Reference Model

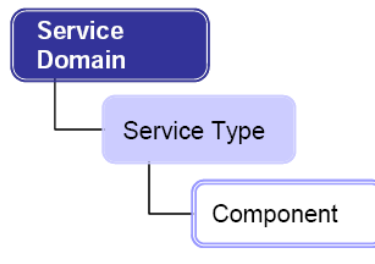
The Data Reference Model (DRM) provides a standard way to describe data across the federal government in order to promote information sharing across agencies.



As part of the Smithsonian's digitization planning effort, a Smithsonian Common Data Model team was established to develop a Common Data Reference Model for the Smithsonian's core mission areas. This reference model is designed to identify and describe the commonly shareable data elements across the Institution and identify current standards and authorities in use for specific data elements and subject areas.

2.1.2.5 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

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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.

2.1.3 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 effectively 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 foreign national employees at STRI adds to the challenge of 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 <i>Status: Adopted</i>	<p>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) are an appropriate guideline to adopt even though as a Trust Instrumentality of the United States, the Smithsonian is not subject to the FTR.</p> <p>In FY 2007, the Smithsonian deployed GovTrip. In response to the needs of our travelers, the Smithsonian continues to improve the process supporting our significant amount of International travel, and in 2009 selected Executive Travel Associates to augment the standard GovTrip services by offering an alternative mechanism to efficiently plan and book complex domestic and international trips in conjunction with the GovTrip system.</p>

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Initiative	Service Description
<p>EHRI <i>Status:</i> Partially Adopted</p>	<p>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.</p> <p>The Smithsonian continues to provide the EHRI initiative 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 as the Office of Personnel Management (OPM) prohibits the inclusion of non-civil service employees in OPM systems, including EHRI.</p> <p>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.</p>
<p>E-Clearance <i>Status:</i> Partially Adopted</p>	<p>The Smithsonian Institution is participating in a limited fashion in the E-Clearance Initiative, specifically by using the E-QIP tool to automate the submission of background investigation forms on the Institution's staff, contractors, volunteers, and interns who are issued Smithsonian badges. 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.</p>

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Initiative	Service Description
E-Payroll <i>Status: Adopted</i>	One of the first E-Government Initiatives to be deployed and provide immediate benefits was E-Payroll. The Smithsonian recognizes that payroll is 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 United States Department of Agriculture's National Finance Center.
E-Training <i>Status: Adopted</i>	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 which provides information on the availability of learning opportunities, and tracks the progress of individual students. Currently the Smithsonian maintains a limited number of user accounts for specific Smithsonian personnel who have specialized training needs. The Smithsonian has identified some areas of need within the Institution that are not fully served by the E-Training offerings such as courses in Spanish, 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 <i>Status: Adopted</i>	The Smithsonian must be prepared to meet any emergency, natural or man-made, while continuing to provide core services. 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 is a "Category 4" agency that plays no significant role in providing critical government services during an emergency. Based on the Smithsonian's categorization, the Institution has identified critical staff and deployed the necessary tools to provide for continued communication and operation of vital Smithsonian functions during an emergency.

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Initiative	Service Description
Federal Asset Sales <i>Status: Adopted</i>	<p>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 for our federal assets.</p>
HSPD-12 <i>Status: Partially Adopted</i>	<p>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. The Smithsonian has strengthened its processes for verifying identity before issuing credentials and now requires two forms of identification as well as fingerprints when applying for a new credential.</p> <p>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 to all Smithsonian staff, volunteers, and interns outweighs the benefits to the Institution. The Smithsonian has several staff members that do require HSPD-12 PIV compliant credentials and has contracted with GSA to provide PIV credentials to select staff members on an as needed basis.</p>

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Initiative	Service Description
Integrated Acquisition Environment <i>Status: Adopted</i>	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. The Institution integrates completely with FPDS-NG but does not currently integrate with the CCR system 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. A new version of the CCR is due to be released in FY12 at which time the Smithsonian will evaluate developing a more robust integration. The Smithsonian continues to work with IAE as our PeopleSoft/Oracle ERP matures.
USA Spending <i>Status: Adopted</i>	The Smithsonian receives a substantial amount of its annual funding from Congressional appropriation, and fully complies with the OMB budget request and tracking processes. As such, it posts spending data on USASpending.gov --providing transparency and accountability into how the Institution is using appropriated funds.
Recovery.Gov <i>Status: Adopted</i>	The American Recovery and Reinvestment Act of 2009 provided funding for a number of "shovel ready" projects that would provide for both infrastructure improvements and economic stimulus. The Smithsonian received funding for facilities improvement and upkeep projects. The Institution complies with the provisions of the Act that require agencies to post details about contracts issued on Recovery.Gov .

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Initiative	Service Description
Recreation One-Stop <i>Status: Adopted</i>	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.
Geospatial One-Stop <i>Status: Partially Adopted</i>	The Smithsonian participates in the Geospatial One-Stop Initiative by posting geospatial data created at the Smithsonian Environmental Research Center on Geospatial One-Stop.
Recruitment One-Stop <i>Status: Partially Adopted</i>	The Smithsonian Institution is comprised of a mix of federal and Trust employees, and strives to reach the broadest pool of candidates when recruiting future employees. In that vein, it posts all qualifying job opportunities on USA Jobs.
Data.Gov <i>Status: Under Review</i>	The Data.Gov Initiative is a government-wide effort to make raw data easier to discover and use by the very public for whom it is produced. The Smithsonian participates in the Data.Gov working group, but has yet to make any data available via the Data.Gov portal mainly due to restrictions in how data must be made available. The Institution is working with the Data.Gov group to ease restrictions on publishing data only from within the dot-gov domain that would facilitate Smithsonian participation.

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2.1.4 Lines of Business Initiatives

The Federal Government line of business (LoB) initiatives are business-driven solutions targeted at specific functions that cut across agencies in the Federal Government. The 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
<ul style="list-style-type: none">• 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.
<ul style="list-style-type: none">• Human Resource Management	As with Smithsonian's financial management needs, the Institution's human resource needs cover more than just federal employees. Trust, Smithsonian Enterprises 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.
<ul style="list-style-type: none">• 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.

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- **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.
- **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.

2.1.5 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.

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The Smithsonian's Strategic Plan informs 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 in the Smithsonian Data Center
- 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
- Internal Collaboration Environment (e.g., Sharepoint)
- VoIP & other Telecommunications
 - Desktop Video Conferencing

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.

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The Smithsonian Information Technology Management and Planning 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 2.1.3 *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 ever increasing decision to adopt Software as a Service (SaaS) and open source software solutions when appropriate:

- Smithsonian Data Center & Slnet
 - Server Virtualization
 - Fully functional IPv6 environment
 - Tiered Storage
 - Centralized Archival Storage scaled to meet growing demands
 - Secure Wireless Network throughout Smithsonian Facilities—including free public wifi
 - Operational Forensics
 - Security Infrastructure Services that keep pace with emerging threats
 - Disaster Recovery Services for email
- VoIP & other Telecommunications
 - Mobile Technology/Wireless
- Centralized Services / Programs
 - Periodic Hardware Replacement
 - Periodic Server Replacement Program
 - Centralized Printer Management
- Digital Asset Infrastructure
 - Enterprise Digital Asset Management (DAM)
 - Enterprise Digital Asset Network
 - Curation of Scientific Data
 - Researchers' Repository
- Web Shared Services
 - Continued Refinement of Google Search to support findability of content from SI websites

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- Social Networking/Web 2.0 enabling shared services
- External Collaboration Environment (e.g., Sharepoint)
- Web Shared Services (event calendaring, registration, ticketing, e-commerce, etc.)
- Distance Learning

Please refer to Chapter 9 for more details about the “to be” architecture.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Smithsonian Data Center and Slnet:			
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)	10/2010		ongoing
IPv6 Network backbone	06/2008		06/2008
IPv6 Server transition	12/2009	09/2012	
IPv6 Workstation Transition	10/2010	09/2014	
IPv6 Fully functional environment	02/2011	09/2014	
Operational Forensics Routinely Used	TBD		
VoIP & Other Telecommunications			
VoIP @ Off-Mall Locations	05/2010		07/2011
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
Server Virtualization, VMWare Server Farm	04/2011		
Centralized Printer Management	TBD		
Digital Asset Infrastructure			
Deploy Enterprise DAM	12/2009		09/2010
Enterprise Digital Asset Network	TBD		10/2009
Curation of Scientific Data	TBD		

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Web Shared Services			
Sharepoint, Internal Collaboration	05/2009		12/2009
Sharepoint, External Collaboration	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 (FY12): X Fully Funded
 Partially Funded
 Not Funded

Production Date: Ongoing

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2.2 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 lifecycle management process definition and improvement.

Smithsonian product assurance staff work with project staff to tailor the project lifecycle management (LCM) deliverables, reviews and events as permitted per TSG IT-920-01, *Lifecycle Management Manual*. This process identifies the minimum number of deliverables, reviews, and milestones 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.

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2.2.1 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 lifecycle 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. An assessment report is delivered at the close of a given lifecycle 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.

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2.2.2 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 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.

2.2.3 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.

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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.

2.2.4 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 lifecycle 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 lifecycle 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.

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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 lifecycle 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.

2.3 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.

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.

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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.

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Snapshot: Collections Management

LOB: Education (106); Knowledge Creation & Management (202)

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
<ul style="list-style-type: none"> • Interlibrary Loan Manager (2007) • SELGEM • LCIS (NMAH) 	<p><i>Target Architecture:</i></p> <ul style="list-style-type: none"> • ArtCIS • Castle Collection • NMAH CIS • NMAI CIS • DAMS • MACAW <p><i>Candidate for Replacement:</i></p> <ul style="list-style-type: none"> • SIRIS (2013/2014) • Digital Library Program • Archive Management System (AMS) • Digital Logbook 	<ul style="list-style-type: none"> • AMS 2 	<ul style="list-style-type: none"> • Digital Archive • SIRIS Replacement • SIL PDS

Future Considerations / Performance Gaps

- 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 collections 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.

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Snapshot: Scientific Collections Management

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

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
<ul style="list-style-type: none"> • SELGEM • NZP-MedArks (2010) • Transaction Mgmt System, 2011 • NZP Animal Keepers' Report (2012) • NZP-ARKS (2012) • NZP-MedarX (2012) 	<p><i>Target Architecture:</i></p> <ul style="list-style-type: none"> • NMNH RCIS • Orchid CMS • DAMS • Keeper Reporting System • <i>Identified for Replacement:</i>NZP-SPARKS (2014) 	<ul style="list-style-type: none"> • ZIMS 	<ul style="list-style-type: none"> • 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 collections 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.

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3.1 Library & Archive Systems

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.

3.1.1 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, 13 archives, and other specialized research databases at the Smithsonian. Easily accessible via the web, SIRIS provides worldwide access to 1.7 million collection records with hyperlinks to images, video and sound files, electronic journals, and related websites.

SIRIS is built upon commercial off-the-shelf library information system software. The current software is Horizon, a product of the SIRSI/Dynix Corporation. SIRSI/Dynix has ceased development of the Horizon product. Accordingly, the Smithsonian will need to identify, fund, procure and then migrate SIRIS to a new product in the FY 2014-15 timeframe.

The holdings of SIRIS include:

- *The Smithsonian's Library catalog.* The Smithsonian's library collections contain over 1.7 million volumes, including print and electronic serials, rare books and manuscripts. Smithsonian Institution Library (SIL) collections are particularly strong in natural history, tropical biology, and Chesapeake Bay area ecology; Anthropology; American and African American history and culture; postal, horticulture and garden history; the history of science and technology; aerospace history, astronomy, and planetary sciences; African, American Asian, contemporary, and design and decorative art; conservation science, and museum studies. In addition, SIL has over 400,000 historical trade catalogs, representing over 30,000 companies featuring predominantly American-manufactured products for industry, agriculture, business, and decorative arts. Primarily

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from 1880-1945, the collection includes product catalogs, technical manuals, advertising brochures, price lists, and company histories. SIL also has 100,000 art and artists files that contain exhibition announcements, newspaper and magazine clippings, press releases, brochures, reviews, invitations, illustrations, resumes, artists' statements, and exhibition catalogs.

- *Archival, Manuscripts & Photographic Collections catalog.* The Archival, Manuscripts and Photographic Catalog is comprised of over 286,500 primary bibliographic records and over 209,371 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 13 archival repositories at the Institution. The records are stored and retrieved together in the catalog, which contains approximately 130,131 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 708,824 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), American Art's Photograph Archives, and the Pre-1877 Art Exhibition Catalogue Index. The databases are used to support collection development, conservation, 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 12,597 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 17,591 bibliographic citations on a variety of specialized topics—from cephalopods and marine mammals, to museum studies.
- *Directory of Airplanes Catalog.* 43,469 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.

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- SIRIS records are included in the Smithsonian's Collections.si.edu pan-Institutional searching center, developed using EDAN, along with records contributed by the Smithsonian's museum collections information systems.

In FY2008, the SIRIS Members' community conducted a comprehensive market survey to explore developments in the commercial integrated systems arena as well as open source solutions for libraries and archives information management. This market evaluation was precipitated by two factors: 1) In March 2007, Horizon's vendor announced that it would be abandoning further development of Horizon products and would end support in 2012 (extending support has since continued driven by user demand but will not be indefinite), choosing instead to focus on and migrate users to its *Symphony* library management system software; 2) At the same time, the digital world, end user expectations and modes of information delivery, are driving changes especially for the library and archive communities. Consequently, the ILS software market is in a great deal of flux.

In October 2009, SIRSI/Dynix issued a revised software development roadmap removing the deadline for ending support for existing *Horizon* implementations. As a result of this announcement, the SIRIS community will continue its use of *Horizon* upgrading to the latest / final release, monitor developments in the library information system market, and seek funding for a replacement system.

In evaluating replacement options, consideration will be given to: next generation and open source software systems that are beyond the traditional Integrated Library System (ILS) model which has become outdated given new trends and requirements; the changing landscape in the area of archival collection information and management systems; the role of SIRIS in meeting the goals of Broadening Access and Strengthening Collections as outlined in the Smithsonian Institution's Strategic Plan and Web and New Media Strategic Plan, where the emphasis on web accessibility and Web 2.0 enhancements to collections information systems are outlined; and the need for interoperability with an increasingly sophisticated and complex suite of systems in use at the Smithsonian to create, describe, manage and store digital assets using a Digital Asset Management System.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
<i>Horizon</i> Operational	1985		1985
Implement <i>Horizon</i> 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

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
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 <i>Horizon</i> databases	08/2007		08/2007
Migrate Freer Sackler library records into SIRIS	10/2008		08/2008
Form Market Survey Technical Working Group	02/2008		03/2008
Define functional requirements, conduct market survey, prepare analysis/report of findings	03/2009		05/2009
Archival units test the Archivists Toolkit open-source solution	12/2010		12/2010
Horizon data interoperable with DAMS	12/2010		12/2010
Update Horizon 7.5 & Horizon Information Portal 3.09 software and Sybase database release 15	06/2011		08/2011
Hardware migration for Horizon Information Portal and sirismm web server	07/2012		
Hardware migration for Horizon and Sybase server	09/2012		
Migrate Still Image web service to DAMS	09/2012		
Update Horizon & Horizon Information Portal software and Sybase database back-end to the latest release	06/2014		
Obtain funding for Horizon Replacement system and implementation	TBD		
Migrate SIRIS to new software platform	TBD		

c. Benefits

SIRIS supports the Smithsonian strategic plan and priorities of broadening access to reach new and more diverse audiences, expanding its degree of engagement with the public in Washington and throughout the country, improving the quality of the Smithsonian impact on its audiences both through its public programs and scientific research; encouraging cross-unit relationships and collaborations, improving the stewardship of the national collections for present

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and future generations, and enhancing the technological infrastructure to ensure functionality, security and strategic use of IT systems. It does so by providing:

- **Public access.** Information about the Institution’s library and archival holdings (some **1.7 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.

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

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3.1.2 MACAW

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

a. Description

MACAW, which is a loose acronym for "Metadata Collection and Workflow," is an application which facilitates the rapid capture workflow used at the Smithsonian Libraries. It is written in PHP and uses PostgreSQL database. It can be run on most *nix OS, though currently works best on Linux running Apache 2.2.

Macaw has three primary functions, to:

1. *Move and transform scanned images.* Macaw takes scanned .tiffs and transforms them into JPEG2000 format, compresses them, and extracts image dimension information which is then stored in the page-level metadata xml files.
2. *Facilitate creation of page (image)-level descriptive metadata.* Macaw does Z39.50 calls into a library catalog (currently SIRIS) to extract MARC records for items being scanned, and transforms those records into MARCXML. Alternately, Macaw will also accept uploaded MARCXML files if they don't exist in a Z39.50 accessible system. Macaw can also extract item-level metadata from an existing datasource (like an SQL database) and store that data in local tables for later export as XML. It can also take uploaded spreadsheets with appropriate item-level information if no database sources are available. Macaw provides an easy to use GUI for staff to enter descriptive page-level metadata for scans, like page number and page type, and takes that data and stores it in an XML file which is compatible with the Internet Archive schema.

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3. *Package and export scanned books and their metadata for submission to Internet Archive and/or other storage systems.* Macaw then packages the xml and image files in a .tar which it queues for upload to Internet Archive. Similarly, it can be configured to queue and move xml and image files to any server or storage system.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Beta Version with upload to Internet Archive	9/2010		10/2010
Publish V.1 as open source on Google Code	10/2011		11/2011
Release V. 1.5 includes ability to accept metadata from a spreadsheet	1/2012		2/2012
Release V.x includes ability to create and export METS	10/2012	6/2013	

c. Benefits

MACAW enables the Libraries' in-house rapid-capture digitization program. Without it, creation of page-level metadata, along with extraction of title and item level metadata from SIRIS, would need to be done manually. Implementing MACAW significantly improves digitization throughput for books and book-like objects.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2011
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SIL

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3.1.3. 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 and digital assets generated by the DLP are currently available primarily through the Internet Archive on www.archive.org/details/smithsonian and the Smithsonian Institution Libraries website in content groups such as the Libraries' *Galaxy of Knowledge* and the *Galaxy of Images* on <http://www.sil.si.edu>. The standards used for image capture as well as image naming conventions and item project metadata, has been developed with an ability to incorporate assets into current or future pan-Institutional image delivery system(s).

The DLP has over 17,000 items (books) consisting of more than 6.5 million images available through the Internet Archive; and nearly 2,000 items, including born-digital publications (.pdf), online exhibitions, webcasts, and bibliographies available on the SIL website. Additionally, the SIL *Galaxy of Images* website includes over 15,000 individually described images from both digitized books and generated by other SIL outreach activities. Extensive metadata records exist for all top-level items.

This system will need to be updated with a new storage architecture and access interface – both search index and Page Delivery System (PDS) -- that can integrate assets currently available via the SIL website with those that are only accessible via the Internet Archive.

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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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		1994
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SIL

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3.1.4 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 web-based SIL PDS was developed in-house using 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	09/2010	6/2012	
Implement PDS for existing digital volumes	09/2011	12/2012	
Integrate all book scanning into PDS workflow	10/2011		10/2011

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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 (FY12):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:		TBD
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SIL

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3.1.5 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, collections use statistics, rights management, preservation management, and space management. These features yield full and efficient control of SIA's collections in every stage of archival management: curation, storage, preservation, and research use. The system provides centralized management of SIA collections in the District of Columbia, and Pennsylvania; as well as to objects on loan from SIA to other museums and galleries.

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.

Due to changes in supported technology at the Institution and in the IT marketplace, the current technology platform can no longer be sustained nor does it provide sufficient capacity for the expanded responsibilities and services of SI Archives. Therefore, the current AMS is at its end-of-life state.

b. Benefits

The integration of specialized features into a single, centralized archival management system allows Smithsonian Institution Archives to achieve: excellent intellectual control of its collections; timely and effective collection and preservation management; and broad access to its unique collections by researchers, scholars, Smithsonian senior management, Smithsonian curatorial staff, and the general public.

The AMS facilitates use of the collections in scholarly publications, films, special Institutional initiatives (e.g., Smithsonian Networks), as well as loans to national and regional museums and other Smithsonian units.

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c. Status @ a Glance

Funding Status (FY12):	Fully Funded Partially Funded X Not Funded
Production Date:	1998
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• SIA

3.1.6 Archive Management System 2

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 2 (AMS) is a collection management and information system particularly designed to handle the needs of archives and research with capacity for use by other Smithsonian archival units as well.

In addition, a replacement AMS will include features to support broadening access via the Internet as well as promoting increased staff productivity. 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.

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The success of the AMS 2 during the planning period will be gauged by tracking:

- Identification of architecture and platform modifications necessary to support use by multiple archives and similar groups within SI.
- Replacement of the technological platform or acquisition of a comparable system.
- Maintain 90% online availability or higher
- Support planning and tracking of collection use initiatives via standard methods as well as leveraged Internet access.

b. Benefits

The integration of specialized features into a single, centralized archival management system allows Smithsonian Institution Archives to achieve: excellent intellectual control of its collections; timely and effective collection and preservation management; and broad access to its unique collections by researchers, scholars, Smithsonian senior management, Smithsonian curatorial staff, and the general public.

The AMS facilitates use of the collections in scholarly publications, films, special Institutional initiatives (e.g., Smithsonian Networks), as well as loans to national and regional museums and other Smithsonian units.

c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2013
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SIA

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3.1.7 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. Additionally, SIA has incorporated the collections of the former Smithsonian Photographic Services unit which merged with SIA. 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.

The Digital Archive houses digitized master files of analog image, audio, video, and film collection material. SIA is expanding its digitization activities in all of these areas in order to broaden access to its collections. The Digital Archive plays a key role as a trustworthy system necessary to provide these services both in its reading rooms and over the Internet. In addition to regular research use, digital records from SIA have been used in exhibitions, publications, documentaries, and films.

The Digital Archive handles a wide range of data formats thereby making it possible to preserve many different record types including, but not limited to:

- images
- oral and video histories
- digital correspondence, including email
- websites
- facility blueprints and related construction documentation
- webcasts, podcasts, and social media
- streaming audio and video
- databases

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The Digital Archive has grown dramatically over the past five years. Digital collection records include the official business correspondence of the Institution which is now largely conducted via email, email which is preserved by SIA and housed in its Digital Archive. Acquisition of born digital collections material also continues to accelerate aggressively. In 2011, over 90 (30%) of the collections acquired that year contained born digital records. Historic growth suggests that SIA's overall digital holdings and digitized surrogates should increase by a minimum of 50% annually for the next two years and by a minimum of 65% the three years following. Several digitization projects underway or currently scheduled in the next five years must be accommodated. Sustained success depends on regular equipment and software upgrades, acquisition of rapid capture imaging systems 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 in an environment where 6 out of 7 people visiting the Institution or conducting research do so over the Internet. The Digital Archive provides the following benefits:

- 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 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.

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c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		TBD
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SIA • SI-wide

3.1.8 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, which includes over three million photographs in a variety of physical formats, the oldest of which date back to the mid 1800s.

The Digital LogBook in the course of its' daily workflow, is used by staff photographers in NMNH, NMAH, NASM, and SIA; and by curators from around the Institution. The system is integral to the fulfillment of requests from the public, publishers, researchers and staff for Smithsonian images. The Digital LogBook will eventually be replaced by the Smithsonian DAMS, and work is currently underway to move this increasing body of collection material into the DAMS.

c. Benefits

The Digital LogBook facilitates good intellectual control practices and ensures that descriptive and rights metadata is maintained in a web-accessible manner; supports the use of industry standard protocols for descriptive and rights metadata embedded in the images.

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c. Status @ a Glance

Funding Status (FY12):

X Fully Funded
Partially Funded
Not Funded

Production Date:

2009

Enterprise Architecture:

X Target Architecture
Candidate for Replacement

Units Supported:

• SIA • SI-wide

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3.2 Museum Systems

The use of CISs facilitates physical and legal control of official 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. The CIS has also evolved as the repository for the metadata that makes the object meaningful by enriching registrarial-level records with research findings and curatorial notes that have previously been separated from the collection item to provide access to rich and consistent digital information about collections.

3.2.1 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

The National Museum of American History Collections Information System (NMAH CIS) supports collections management, research, and public access to the museum's collections.

NMAH uses a relational database system developed by Selago Design (Mimsy XG) to ensure responsible stewardship over the collections and to support the educational missions of the Institution and the museum.

NMAH CIS Mission and Goals

Mimsy XG enables NMAH to meet several key strategic goals in fulfillment of its CIS mission to:

- Maintain basic CIS data, operations, and services.
- Address CIS data deficiencies (text and images) identified in the 2006 report from the "NMAH Collections Information System Data Analysis Project" and the 2010 Smithsonian inspector general findings from the "NMAH Collections Stewardship Audit."
- Activate previously unused XG modules in collections management functional areas.

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- Convert collections data for offsite collections to XG.
- Significantly expand and enhance access to the collections via the web.

NMAH CIS and Smithsonian: Mission and Goals Relationship

NMAH goals align with the SI Strategic Plan in the areas of “broadening access,” “strengthening collections,” and “enabling our mission through organizational excellence.” Complete, accurate, and quality data throughout the NMAH CIS will make it possible for the museum to provide “online access” to collections information and specifically will position the museum to “substantially expand access to collections through digital technologies”-- identified as a “major Institutional priority.”

NMAH goals also align with the SI Digitization Strategic Plan. The plan states that “broaden[ing] access” to SI collections “is an imperative” and that the strategy “to digitize our collections...along with the descriptive, interpretive information that accompanies them” “is one of the best investments we can make in our future.” It advocates taking an “approach to digitization based on carefully crafted standards and best practices that will ensure the highest fidelity and the widest range of uses.”

NMAH CIS Audiences

From an audience perspective, the NMAH CIS fosters vigorous use of the collections and increases public access to them. It provides the means to maintain and strengthen connections to existing audiences and opens the way to reach new and underserved audiences. The scope of NMAH audiences is local, regional, national, and international.

NMAH audiences include: Smithsonian and NMAH management; Smithsonian and NMAH staff (curatorial, collection management, public programs, public affairs, and development); external scholars and researchers; external educators and students; specialized public audiences; and the general public.

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NMAH CIS Status

NMAH deployed its CIS in February 1996 and converted legacy data over the next 7 years. Starting in the early 2000s, staff departures (including the CIS manager) throughout the collections documentation and curatorial units along with decreased funding lowered resource levels below the point needed to sustain a stable CIS. By the end of 2003, the NMAH CIS had destabilized. Work slowed or stopped in critical areas. NMAH Senior Management flagged the CIS for priority attention. A first phase proposal was prepared to restabilize the CIS and integrate it with other Museum work. Action was taken to stem further erosion.

- In mid-2004 NMAH received funding to assess the current state of the CIS data and develop recommendations needed for the data to meet standards. The critical finding was that the state of the CIS was in serious jeopardy and that the data was inconsistent, error-ridden, and unreliable. Information could not be effectively retrieved nor displayed. The conclusion was that NMAH could not rely on information in the CIS to support public outreach, research, collections management, and new media initiatives—and as a result, these activities were compromised.
- In the fall of 2004, the Collections Documentation Services Unit Manager vacancy was filled, providing a manager for the CIS, as well as leadership for the program within which the CIS resides.
- In early 2006, NMAH established a Digital Asset Management and Preservation Program (DAMPP) to ensure that collections images are appropriately digitized, searchable, preserved, and widely accessible for scholarship, collections management, and sharing with a national and worldwide audience via the web. At that time, digital assets lacked management and oversight. In particular, collection images reflected poor production, format, quality, and metadata—and were largely unlinked to CIS records.
- Between the September 2007 and February 2008, NMAH upgraded its CIS to MIMSY XG, relocated the server, converted the collections data conversion; selected standardization; and held basic user training.
- In September 2008, a collections documentation specialist position was added to the CIS program.

Over the last five years, NMAH has evolved a strategy for carrying out CIS work through prioritized projects that maximize benefits across the stewardship and public access spectrum and that employ a modified approach derived from the museum's collections care methodology. In this project-based context, the state of the CIS data (text and images) has been improved and steps have been taken to significantly broaden access to the collections.

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b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
System			
Deploy Multi MIMSY version 2.5.2d	04/2001		04/2001
Upgrade CIS server and DBMS	12/2001		11/2001
Document current state of CIS (2006 “Zorich” Report)	09/2004		09/2006
Relocate CIS servers to SI Data Center	06/2007		01/2008
Upgrade NMAH CIS to MIMSY XG & customize to meet curatorial req’ts	06/2007		02/2008
Analyze collections management requirements (outgoing loan program)	09/2008		09/2008
Analysis of collections management acquisitions and object processing programs	12/2009		09/2010
Upgrade MIMSY XG to version 1.5	03/2010		01/2012
Develop systematic and comprehensive CIS training program, basic level	04/2010		02/2010
Analyze collections management requirements (preservation program)	09/2010		03/2011
Implement recommendations for collections management requirements (acquisitions program)	12/2011	05/2012	
Analyze collections management requirements (incoming loan program)	12/2011		12/2011
Develop systematic and comprehensive CIS training program – intermediate / advanced level	09/2012		
System [pending funding]			
Analyze collections management requirements (incoming loan program)	TBD		
Implement recommendations for collections management requirements (outgoing loan program)	TBD		
Implement recommendations for collections management requirements (objects processing program)	TBD		
Implement recommendations for collections management requirements (preservation program)	TBD		

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Data Migration and Enhancement			
Migrate 505,000 SELGEM records			08/2001
Migrate 125,000 FileMaker Pro records	11/2001		11/2001
Migrate 124,000 LCIS records	10/2002		12/2002
Data entry for backlogged acquisition records (3,123 records)	12/2001		09/2003
Conduct Medical Sciences object tracking pilot project	06/2010		07/2010
Conduct inventory of Agriculture and Natural Resources collections in room 5028	07/2010		09/2010
Conduct inventory of Military History collections in rooms 4017 & 4023	07/2011	12/2013	
Conduct object tracking accountability work for PSRP III relocation project	06/2012	04/2012	
Conduct object accountability work for 10,000 collection items in Work & Industry	06/2013		
Begin object accountability work for Medical Sciences collections, room 5026	05/1/2013		
Complete data entry for 2,500 acquisition files	12/2013		
Data Migration and Enhancement [pending funding]			
Reconcile/verify offsite storage locations & merge data with MIMSY XG records	09/2010	09/2012	
Complete object accountability work for Medical Sciences collections, room 5026	TBD		
Data Cleanup			
Conduct pilot project for data clean-up identified in the 2006 Zorich Report for NMAH collections	09/2012	09/2013	
Data Cleanup [pending funding]			
Continue data clean-up work identified in the 2006 Zorich Report for additional NMAH collections	TBD		

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Web Access			
Identify processes and establish procedures for preparing Multi MIMSY 260 object records (text and images) for "Collections on the Web" pilot on the NMAH Internet site	11/2004		07/2005
Prepare and publish 1000 objects for NMAH's Collection on the Web project	06/2011		02/2011
Develop and test data mapping for EDAN participation	06/2011		03/2011
Prepare and publish 1000 objects for NMAH's Collection on the Web project	06/2011		06/2011
Prepare and publish 1000 objects for NMAH's Collection on the Web project	06/2012		
Web Access [pending funding]			
Prepare and publish 10,000 objects for NMAH's Collection on the Web project	TBD		
DAMPP			
Create digital images of 13,800 objects and link these to Multi MIMSY records	09/2002		09/2004
Conduct pilot to digitize images of 5000+ objects and 500+ audio files, and link these to Multi MIMSY	09/2006		04/2007
Standardize metadata for 2 terabytes of existing digital files	06/2010		04/2011
Begin migration / ingestion of digital files to SI DAMS	09/2010		09/2010
Develop middleware to bridge SI DAM with MIMSY XG	TBD		
Standardize metadata and ingest 5,000 digital files to SI DAMS	03/2011		03/2011
Standardize metadata and ingest 60,000 digital files to SI DAMS	12/2012		
Link 25,000 images to Mimsy XG records	12/2012		

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
DAMPP (pending funding)			
Develop middleware to bridge SI DAM with MIMSY XG	TBD		
Standardize metadata and ingest 60,000 digital files to SI DAMS	TBD		
Link 25,000 images to Mimsy XG records	TBD		

c. Benefits

As the nation’s history museum, the National Museum of American History (NMAH) is committed to documenting and preserving the rich and diverse history of this country through active collecting and research and to engaging the public in that history through exhibitions, programs, and other forms of outreach. NMAH collects the material culture of people in America and preserves it for the benefit of present and future generations. Our collections form the foundation for research, scholarship, exhibition, public programs, and outreach.

Through the use of our collections information system, MIMSY XG, NMAH can meet several key strategic goals in fulfillment of its CIS mission to improve the quality and quantity of the CIS data and increase access to its collections by:

- Maintaining accountability for the collections.
- Assisting collections management activities;
- Ensuring legal, physical, and intellectual control over collections;
- Providing the informational basis for research, exhibitions, publications, and public programs;
- Broadening staff and public access to the collections in a variety of ways, including via the web.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		1996
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• NMAH

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3.2.2 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 museums are unified by their use of *The Museum System (TMS)*, a commercial software product.

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.

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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.

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. 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)*.

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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 & NASM	12/1998		12/1998
Implement TMS at NPM	02/2001		02/2001
Implement TMS at ACM	12/2005		10/2005
Launch Arago collections website at NPM	05/2006		05/2006
Upgrade software for Collections Online Web Interface	07/2006		04/2007
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		03/2010
Integrate into EDAN cross-searching: NASM and FSG databases	12/2009		12/2009
Integrate into EDAN cross-searching: CHNDM databases	02/2010		02/2010
Integrate into EDAN cross-searching: NMAfA, ACM	04/2011		04/2011
Integrate into EDAN cross-searching: NMAH	05/2011		05/2011
Upgrade to TMS 2010	07/2010		05/2011
Upgrade to TMS 2010 R3	04/2012		

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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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		1998
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		<ul style="list-style-type: none">• ACM• CHNDM• FSGA• HMSG• NASM• NMAAHC• NMAfA• NPG• NPM• SAAM

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3.2.3 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. Data for the Media and Paper Archives will also be incorporated into the CIS as the next

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step in reintegrating all NMAI collections within a single CIS, with a projected implementation to occur in FY 2012.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Initiated survey of COTS CIS products	09/1997		09/1997
Establish NMAI CIS Steering Committee	09/2001		09/2001
Move Information System:			
Initiate project	10/1998		10/1998
Deploy system	05/1999		05/1999
Migrate system to SQL	12/2001		12/2001
Re-engineer Move Information System	04/2002		09/2002
Collections Information:			
Complete CIS requirements analysis & market survey	02/2002		04/2003
Acquire CIS software product	05/2002		04/2004
Complete imaging of entire collection	06/2004		03/2004
Deploy CIS software	09/2003		04/2006
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
Enhance existing Objects and Photo Archives records with data from internal and external publications	10/2007	12/2008 (partially)	ongoing
Initiate enhancing existing Objects records with data from Repatriation case reports	10/2006	06/2009 (partially)	ongoing
Implement standards for geographical site information	05/2007		05/2008
Data entry of verbatim Photo Archives Catalog Card Information	03/2008		03/2009
Implement standardized thesauri & classification terms across collections-related systems	09/2007	09/2009 (partially)	ongoing
Implement use of CIS for archival processing	10/2010	09/2012	

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Public Access:			
Provide public access to selected CIS data on the Web	01/2007		02/2009

c. Benefits

Collections information, as a primary means of documenting and understanding the collections, is one of the NMAI's primary responsibilities and 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.

All NMAI constituents, internal and external, will benefit immediately from the success of this work. Standardization and enhancement of collections information will result in clarification, correction, and increased accessibility of information in the CIS. The benefits will be passed on to our constituents through various means, including direct response to information requests, updated records on the NMAI Collections Search web site, exhibits, publications, and other modes of information dissemination.

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;
- Facilitate legal, physical, and intellectual control over collections;
- Improve quantity and quality of information associated with the collections as the foundation for research, exhibitions, publications, and educational programs;
- Support NMAI work and the needs of Native communities, Native and non-Native researchers, and the public;
- Enhance access to collections and related information for programmatic, research, and other uses;
- Enhance public access to the collections and information about them, including making NMAI collections web-accessible.

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d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2006
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	NMAI

3.2.4 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.

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b. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2001
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		<ul style="list-style-type: none">• OFEO (Castle Collection)

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3.3 Scientific Collections Systems

3.3.1 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 Collections 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.

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In 2011, the data and functionality from the stand-alone Transaction Management (TM) system (the system that enables museum staff to manage and track collections) was migrated into EMu. This migration has provided NMNH with a more-flexible and better-maintained application, as the EMu user interface is considerably more robust than the legacy TM system. The new system provides additional functionality in EMu that allows NMNH users more flexibility in processing and recording transaction-related data. It also provides the ability to directly select catalogued objects for transactions rather than having to rekey the data; the Office of the Registrar now has a better method of reviewing transactions for all the museum's collecting units.

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 over 5.51 million records and 756,719 digital images in RCIS and plans to complete the migration of more than 5.6 million records from over 22 legacy systems to RCIS. Most of these migrated records are publicly available on the Web. About 80 million records are needed to adequately represent all of the over 126 million objects and specimens. Presently, the Museum makes accessible more than 5.26 million records and 743,667 digital images via the Web (<http://collections.nmnh.si.edu/>) for universities around the globe, students of all ages, scientists from all disciplines, U.S. Government departments, and foreign governments.

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b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Transaction Management implementation & migration to <i>EMu</i>			
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 <i>EMu</i>	07/2003		06/2005
TM client implementation and data migration to <i>EMu</i> complete (75,000 transactions include 87 million transacted items)	06/2005		9/2011
Complete MCS client implementation & data migration for...			
Establishing RCIS (MCS) Project Team			08/1995
Deploy <i>EMu</i> version 1.0 for initial production processing	05/2001		08/2001
Invertebrate Zoology SELGEM catalogue records (786,000)	05/2001		08/2001
Mineral Sciences <i>Paradox</i> catalogue records (350,000)	10/2001		06/2002
Volcano Reference File (<i>Paradox</i>) (100,000)	02/2002	12/2012	
Botany <i>Inquire</i> 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 <i>Inquire</i> catalogue records (1,863,000)	01/2003		04/2003
Anthropology <i>Inquire</i> catalogue records (500,000)	10/2002		08/2003
Repatriation Bone Lab records (99,500)	12/2008		10/2008
Catalogue Card Images (400,000)	08/2004		08/2004
Images (25,000)	08/2004		08/2004

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Entomology SELGEM & <i>Inquire</i> 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		09/2009
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		09/2008
(150,000)	09/2003		09/2008
Botany (500,000)	01/2003		09/2006
(350,000)	09/2003		12/2011
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	12/2012	
Add additional data to <i>EMu</i> (250,000)	09/2003		09/2009
and make it publicly available (350,000)	09/2007	09/2015	
Images publicly available (19,500)	06/2004		09/2007
Combine <i>EMu</i> cataloguing & the Transaction Management System functions into a single system	01/2010		12/2011

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c. Benefits

RCIS supports the Smithsonian Institution's strategic goals of broadening access, excellence in research, and strengthening collections. 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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2001
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• NMNH

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3.3.2 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 (NZN) 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. NZN currently uses two ISIS software modules to help manage its animal collection: the Animal Records Keeping System (ARKS), 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. NZN 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 has announced a release of a web-based global Zoological Information Management System (ZIMS 2012) which is slated to replace the current animal collections catalogue software, ARKS. ZIMS continued planned development is to include both the medical (Medarks) and studbook (SPARKS) functionality by FY15. As an interim, the National Zoo developed MedarX to support animal health records. Currently, the National Zoo is in negotiations with ISIS to include MedarX in ZIMS 2012 as the international standard and prototype for ZIMS.

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. NZN is participating in the project as a subject matter expert. Full funding for the implementation of ZIMS at NZN has not been provided at this time. Future costs will need to include federal security regulations compliance features, system training for NZN 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 functionality:

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Phase 1: Basic ZIMS animal records (replaces ARKS). This was accomplished for small institutions in June, 2010 but has not been successfully implemented at large zoos in the US.

Phase 2: ZIMS 2012 animal records enhanced for medical data (replaces ARKS and MedarX)

Phase 3: ZIMS scientific and conservation research functions (replaces SPARKS).

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 (replaces ARKS)	12/2006	12/2012	
Phase 2 (replaces MedarX)	12/2012	12/2012	
Phase 3 (replaces SPARKS)	12/2013	12/2014	
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	10/2012	
Phase 1: Hosted Solution			
Transition Plan	07/2008	10/2012	
Security Plan	11/2006	01/2012	
Disaster/Recovery Plan	11/2006	10/2012	
“Go Live”	12/2007	12/2012	

* 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

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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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2012
Enterprise Architecture:	X	Target Architecture Candidate for Replacement

3.3.3 NZP Animal Keepers' Report / Keeper Reporting System

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

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to maintain both detail information at the local level and generalized information at the global level.

In FY 2011, NZP initiated development of a web-based Keeper Reporting System (KRS) that shares the same data repository as the veterinary medical system (MedarX) has begun. Slated to be in production in the summer of FY 2012, the KRS will feature tools that allow tailoring of basic reports to accommodate each species as the collection changes over time. If cooperative negotiations with ISIS are successful, it is hoped that local records from the KRS will be transportable electronically directly to the ZIMS environment.

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.

Data from the KRS system regarding the administration of medical procedures and drugs flow electronically in real time from the MedarX System to the KRS so that veterinarians can monitor animal health and treatment progress.

Data from both the KRS and the MedarX system can be combined through the KRS complex query searching system to produce reports and statistical graphs for biological research efforts as well as animal care management decisions.

c. Status @ a Glance

Funding Status (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	1990s (2012 projected for KRS)
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• NZP

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3.3.4 NZP MedarX

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

MedarX supports the veterinary health records for the NZP collection as an interim solution while waiting for the ZIMS replacement projected to be delivered by ISIS in FY 2012. It replaces the DOS-based MedARKS previously used at the zoo. MedarX base collections records are updated from the ARKS system with a scheduled batch upload utility. The system supports all official NZP medical records for the collection in the areas of anesthesia, clinical notes, diagnostics, inventory, parasitology, pathology (anatomical and clinical), and prescriptions. Reports can be generated and medical records imported/exported to accommodate animal transfers.

MedarX was developed by the National Zoo and placed into production in October 2009. The system is a functional copy of the ISIS product MedARKS with enhanced pathology functions, and accommodates networking and multiple user access. Unlike its predecessor, MedarX has a web-based interface and uses MS ASP.NET/ MS SQL Server architecture, it allows for the implementation of such safeguards as Active Directory authentication, database record locking, transaction audit trail logging and multi-media (images) data to support medical findings and diagnoses. Further enhancement of the MedarX System Pathology module was completed and placed into production at NZP in FY2010.

b. Benefits

Provides a stabilized system 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. It provides a full and detailed medical record for the individual animal within a single repository (allowing for medically accurate and complete content). MedarX was developed as an interim solution and will offer a simplified technical path for the eventual migration of data into ZIMS.

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c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2010
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• NZP

3.3.5 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.

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Putting collection information into a computerized database, such as *BG-Base*, 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. The collection was completely accessioned in September 2009.

b. 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.

c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		1990s
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• OFEO-HSD

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3.4 Enterprise Digital Asset Management System (DAMS)

Line of Business	Sub-function
Education (106)	Cultural & Historic Preservation (017) Cultural & Historic Exhibition (018)
Knowledge Creation & Management (202)	Knowledge Dissemination (072)
General Science and Innovation (109)	Science and Technology Research and Innovation (026)

a. Description

An enterprise Digital Asset Management System (DAMS) is used to preserve, locate, and share library, archive and museum collection digital assets and as such is a major component of the Smithsonian's digital, and collections support, infrastructure. A DAMS has multiple application components including web and networked user interfaces, a database back-end, a search index and a large storage infrastructure. It provides automatic extraction and capture of metadata, the ability to locate (search), transform, and deliver stored digital assets (images, audio, video) providing a single logical view of assets that may be stored in multiple formats and locations. It enables reuse of the same asset for varied purposes (editing, publishing, web, and other applications) and in a variety of formats while providing cost-effective preservation, security, backup, and recovery.

A digital asset management system is essential to meeting the Smithsonian's objectives for:

- Preservation and stewardship of objects and specimens.
- Organizing, classifying, and locating assets.
- Delivery of digital assets in multiple formats.
- Desktop and Internet access to content-rich collections, exhibitions, and research data.
- 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 is stored on a mixture of PC and external USB hard drives, server and tape storage, CDs, and DVDs, spread across the Institution leaving assets both inaccessible and at risk. Little or no

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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.

Back 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.

By 2007 the Institution recognized that it needed an enterprise DAM, and began taking steps towards this end within available funding limitations.

- In FY2007, the Smithsonian converted the 20 concurrent user licenses of the proof-of-concept implementation to a server-based licensing model needed to move to an enterprise system model.
- In FY 2008, a position was created and filled dedicated to managing the enterprise system. Efforts were undertaken to expand and restructure the initial pilot implementation to an enterprise system. This included the evaluation of the system software, hardware, and metadata model as well as the data and assets ingested to date with the goal of adding more Smithsonian units' digital assets to the DAMS.
- During FY 2009, the multiple pilot repositories were consolidated; the application hardware and software was updated; user roles and asset security policies were restructured; assets were cleaned up; additional units began using the system; a DAMS-to-EDAN image delivery service (IDS) was created; an outside contractor was brought in to assist an SI working group with re-defining the core image metadata model; evaluated the EMC Centera as a component of the storage architecture and found it not suitable; and the project worked with NMNH to develop and test a EMu-to-DAMS integration.

In FY 2010, the number of units using the DAMS grew from 11 to 31, and a new core image metadata model was developed and implemented. The DAMS application

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software, server and storage were upgraded, an automated NMNH EMu - DAMS integration process was tested, and a video/audio metadata model was developed.

In FY 2011 the DAMS project staff continued providing maintenance and support, including business and technical analysis services for numerous SI units. The number of units supported by the DAMS grew from 31 to 38 and the number of ingested assets from 642,600 to 1,100,800. A process was developed to better integrate SIRIS metadata with DAMS assets. Analysis was begun on how to integrate the DAMS (including discussions with Yale University). Development of a video / audio metadata model was completed and the model was implemented in production. Telestream FlipFactory video transcoding support was implemented, including server purchase, setup, and software integration. 2 video pilot projects were completed. One involving a Time Based Media Art (TBMA) work and supporting documentation acquired by NPG, the other for Civil Rights Oral Histories in a partnership between NMAAHC and the Library of Congress. The main DAMS application server was upgraded and the groundwork laid for future implementation of a high-availability configuration. The storage infrastructure was re-architected and migrated (from EMC Clarion SAN to Isilon NAS). An OpenText Media Management 7 test server was setup to evaluate the next software release.

In FY 2012, plans are to fully implement support for video at the enterprise level, add processes for integrating SI's TMS collection information system(s) with the DAMS, and further enhance the hardware and storage architecture, including increasing system component redundancy for higher availability. Additional units will continue to be brought on board with associated projects.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Complete digital asset management requirements analysis & market survey	04/2002		11/2002
DAMS Proof-of-Concept			
Select DAMS	09/2004		12/2004
Deploy DAMS 5.2 to the four pilot units (NMAI, NMNH, NZP, and CFCH)	04/2005		06/2005
Upgrade DAMS to version 6 for additional security controls	06/2005		06/2005
Upgrade DAMS to version 6.5 for Artesia Folder	11/2006		11/2006
Upgrade DAMS storage and backup infrastructure	11/2006		11/2006
DAMS Enterprise Implementation			
Upgrade licensing model from concurrent user to per-server			09/2007
Upgrade server OS and Oracle database	01/2008		01/2008

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Hire dedicated DAMS support position.			06/2008
Establish DAMS user group			12/2008
Initial storage architecture analysis and testing	03/2009		02/2009
Artesia 6.8 SP 2 Upgrade	03/2009		5/2009
XMP fixes and Hot Folder ingest	12/2008		5/2009
User roles and asset security policy creation, data cleanup	12/2009		12/2009
Asset repository consolidation (eliminate separate NMAI infrastructure)	03/2009		06/2009
Oracle database software upgrade			06/2009
Production server upgrades	02/2009		11/2009
System modifications to support EDAN Image Delivery Service (IDS)	03/2009		11/2009
Server hardware and storage expansion	09/2010		12/2009
Redevelop and implement image metadata model and vocabulary	03/2010		03/2010
NMNH eMU integration	03/2009	TBD (per NMNH)	
Artesia 6.8 SP 4 Upgrade	06/2010		06/2010
Enterprise storage expansion – phase 1	09/2010		09/2010
Video metadata model	06/2011		10/2010
Audio metadata model	06/2011		10/2010
DAMS application server upgrade	12/2010		
DAMS Storage Upgrade	09/2011		09/2011
Add support for Video Assets	09/2011		09/2011
Artesia 7.x upgrade	TBD		

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.

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d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2010 (enterprise)
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

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CHAPTER 4: EXCELLENT RESEARCH

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Snapshot: Scientific Research

LOB: General Science & Innovation (109); Natural Resources (117); Knowledge Creation & Management (202)

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
<ul style="list-style-type: none"> • SAO Hydra HPCC • SRO (2012) 	<p><i>Target Architecture:</i></p> <ul style="list-style-type: none"> • SI Hydra HPCC • SI Research Online • STRI Visitor App System • Mathematica • Statistical Analysis Systems • SAO Scientific Computing • SI Researchers' Repository pilot <p><i>Candidate for Replacement:</i></p> <ul style="list-style-type: none"> • Natural Science GIS 	<ul style="list-style-type: none"> • SI Researchers' Repository 	<ul style="list-style-type: none"> • SIGIS • SERC Research Data Collection • STRI Tropical Biology Database

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.

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CHAPTER 4: EXCELLENT RESEARCH

4.1 Scientific Digital Asset Management

4.1.1 Smithsonian Institution Researchers' Repository (formerly SI 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 pan-Smithsonian systematic effort to manage and sustain research data in such a way that its fidelity and authenticity can be ensured while also providing the means to use it in all the flexible ways needed. Instead the current practice at the Smithsonian—and the larger communities to which we belong—is to keep much of it on a hard drive or non-archival CDs and DVDs with no formal approach to managing it for the long-term, and none of the standardization and encoding necessary for repurposing in other contexts especially by people other than those who originally created it. 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 policies and systems would need to address accessing this data in an interoperable way to cut across not only data sets, but also across disciplines..

In order for researchers to manage data collected by their research activities, it must be encoded, organized and described in standardized ways, recognizable by humans and machines. 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 and re-purposing of the digital products or data sets represents a challenge to the research community to manage the provenance, provide interoperability, and ultimately maintain the structure and integrity of the data sets.

A Smithsonian Researchers Repository will ultimately make the results of research available to the public in an easily accessible manner whether it is to another researcher, an elementary science class, or a life-long learner. All of the digital information will be managed such that it can be used in all the ways desired, and allowed by policy, with full confidence that it is intact and uncorrupted for the very long term, as well as to be completely described.

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In order for another researcher to understand and use data from previous research for the same purpose, or to discover research results from one community to be re-purposed in the work of another, the full “story” of the project must be included. For the research to be meaningful to the public, either in the classroom or through all possible communication channels, it becomes even more important that the full story of the research that created all the data be told. The context and meaning of the research must be captured and managed in the same manner as the data that was created in the process.

As of February, 2012 the first complete prototype of a system that can address these issues will begin to be tested. 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.

OCIO created the Office of Research Information Services to be the hub of a support network for research data. This small group of staff within OCIO will organize a collaborative effort to provide services to researcher in the units, as well as to contribute to the ongoing development of the system, to ensure that it is flexible and powerful enough to support all research activities at the Smithsonian.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Develop a pilot repository	10/2011	02/2012	
Complete testing for the first group of 3 pilot data sets	12/2011	04/2012	
Add at least 3 more science pilot data sets	10/2012		
Add at least 3 cultural research projects data	01/2013		
Demonstrate effectively managed data relevant to at least 50% of new small science projects and exhibition research projects	12/2013		
Develop and demonstrate the full suite of enterprise technical and support services for the repository	12/2014		
Provide a fully operational virtual research environment and support network that is usable for research across the institution.	12/2015		

c. Benefits

Currently there is not a central repository that can manage all of the digital content that results from research activities across the Smithsonian. There are some niche sites that hold the content related to the activity of particular organizations, but in many cases data

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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 metadata information kept intact. The provenances of the data sets are protected, and ultimately will be linked with the published research.
- **Automation:** The automation of scientific instrumentation and data collection across all disciplines, where appropriate.
- **Effectiveness:** Not only will scientists and researchers be able to complete their work more efficiently, it will enable them to reuse or repurpose data across disciplines that would otherwise be impossible due to the complexity and non-standard formats. Scientists and researchers will be able to analyze and reuse 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 a 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 (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	TBD
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide Science Units

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CHAPTER 4: EXCELLENT RESEARCH

4.1.2 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. The data on these servers

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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		02/2010
Migrate Digital Repository content to Researcher's Repository	03/2012		

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

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d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2006
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• All research units

4.1.3 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

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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 durable for future generations.

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.

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.

SERC is eagerly watching the development of SI Researchers' Repository, a promising new tool that will facilitate all of the tasks required to make SERC's data accessible and durable. With adequate funding in place to provide a full time data/Web manager (in the broadest sense of the word), SERC will be able to make full use of these new tools to manage new data as they are collected. Additionally, SERC will be able to build on the brief 2-year *Research Data Collection Initiative* initiated in 2001 to preserve and enhance the long term usefulness of data collected over the last 40 years..

b. 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.

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c. Status @ a Glance

Funding Status (FY12):	Fully Funded Partially Funded X Not Funded
Production Date:	TBD
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SERC

4.1.4 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) has been 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 methods 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.

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STRI, both institutionally and individually by scientist, possesses a unique and invaluable collection of slides, photographs, and videos 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	06/2007		04/2007
Digitization of biological collections	03/2007		03/2007
OBio website in Production	05/2007		05/2007
Initiation of STRI metadata system	10/2007		12/2007
Initiation of Digital File Manager	08/2007		12/2007
Initiation of photo & slide collections digitization	01/2008		01/2009
Update Digital File Manager Web Portal	09/2012		

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.

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d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2007
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	STRI

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4.2 Scientific Infrastructure

Line of Business	Sub-function
General Science & Innovation (109)	Science & Technological Research & Innovation (026)
Natural Resources (117)	Conservation, Marine, & Land Management (057)
Knowledge Creation & Management (202)	Research & Development (069)

4.2.1 Smithsonian Institution GIS (SIGIS)

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 creation of a pan-Institutional scientific GIS to consolidate existing GIS systems would 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 and cultural systems, and how they are affected by change. Finally, SIGIS will permit conservation and wildlife biologists, ecologists, geologists and anthropologists 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

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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

The creation of a pan-Institutional scientific GIS remains unfunded, yet progress is being made opportunistically to get the pre-requisites in place should funding become available:

- Beginning in June 2010, the Smithsonian entered into a universal academic enterprise site license with ESRI for the entire Smithsonian staff. This is a first step in the process of reaching an integrated Institution-wide GIS.
- Another step in the process will be the use of GIS with SharePoint technology in FY2012.
- Yet to be achieved is enterprise licensing of satellite image processing software used in many GIS projects.

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.

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d. Status @ a Glance

Funding Status (FY12):	Fully Funded Partially Funded X Not Funded
Production Date:	TBD
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

4.2.2 Natural Science GIS (Stand-alone)

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 Institution:

The Smithsonian Conservation Biology Institute (SCBI) 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. Ongoing 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.

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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.

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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 include a senior Smithsonian scientist 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 (FY12):	X	Fully Funded	
		Partially Funded	
		Not Funded	
Production Date:		1991	
Enterprise Architecture:	X	Target Architecture	
		Candidate for Replacement	
Units Supported:		<ul style="list-style-type: none">• NASM• NMAI• NMNH	<ul style="list-style-type: none">• NZP• STRI• SERC

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4.2.3 Smithsonian Hydra 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 (HPCC) 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 PCs. 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 Department of Anthropology. 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 high performance computing facilities to produce the genomic material as fast and as quickly and efficiently as possible.

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b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Training and development HPCC	11/ 2008		11/ 2008
Installation of Scientific Storage	12/ 2008		12/ 2008
SAO Hydra HPCC:			
Move SAO Hydra to HDC	07/2009		05/2009
Expand Hydra with 14 blades	08/2009		06/2009
Increase Internet 2 bandwidth to 1 Gig	02/ 2009		02/ 2009
Increase Internet 1 bandwidth	02/ 2009		02/ 2009
Provide contractor sys admin support	07/2010		07/2010
Increase storage for HPCC	09/2010		09/2010
1800 node processors HPCC	03/2010		03/2010
2100 processors HPCC	11/2010		12/2010
2500 processors HPCC	07/2011		07/2011
Increase data storage for HPCC by 20TB	07/2011		07/2011
Expand HPCC with two more racks	06/2011		07/2011
Storage upgrade for HPCC and increase storage by 30TB	07/2012		
Refit 36 or more nodes with InfiniBand	07/2012		

c. Benefits

A large (2500 processors or greater) high performance computing cluster (HPCC) installed and maintained in the Smithsonian's Data Center in Herndon is essential for scientists to carry out tasks such as modeling, simulation, image and data processing. The current cluster is equipped with more than 70TB network-attached storage (NAS). By introducing InfiniBand in the next year, a communications link used in high-performance computing, message passing among clustered computer nodes will be greatly improved. The HPCC allows scientists to process very large data sets or run simulations that require more physical memory than a single node can provide...

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d. Status @ a Glance

Funding Status (FY12):

Fully Funded
 Partially Funded
 Not Funded

Production Date:

2010

Enterprise Architecture:

Target Architecture
 Candidate for Replacement

Units Supported:

- STRI
- MCI
- NZP
- NMNH
- SERC
- NASM
- SAO

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4.2.4 SAO Scientific Computing

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.

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Data from major 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” and store 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 requires 50 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 dwarfs 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

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
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 High Performance Computing Cluster	10/2004		07/2009
Implement data archival system	06/2009		09/2009
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		09/2009
Implement High Performance Computing Cluster	10/2004		07/2009

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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		TBD
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SAO

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4.2.5 Mathematica

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

a. Description

The *Mathematica* solution offers a complete workflow—from data import to high powered analysis through automatic report generation and interactive deployment—all in one system, with no need for programming skills by scientists. Functionality includes built-in functions for computation, modeling, visualization, development, and deployment.

b. Benefits

Centralized support 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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2010
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		<ul style="list-style-type: none">• MCI• NMNH• NZP• NMNH, Ft Pierce• STRI• SERC

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4.2.6 Statistical Analysis Systems (SAS)

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 support 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.

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c. Status @ a Glance

Funding Status (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	1980s
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	<ul style="list-style-type: none"> • FGA • NMAH • NMNH <ul style="list-style-type: none"> • NZP • STRI • SERC

4.2.7 STRI Visitor Application System (VAS)

Line of Business	Sub-function
Natural Resources (117)	Conservation, Marine & Land Management (057)
Knowledge Creation & Management (202)	Research & Development (069)
Public Affairs (305)	Customer Service (108)

a. Description

Smithsonian Tropical Research Institute (STRI) annually receives more than 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 (VAS) 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.

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Phase I of the VAS was fully implemented in November 2009 fulfilling all of the goals mentioned above. Phase 2 of the VAS will concentrate on integration of the VAS database with outside Alumni databases as well as providing enhanced query and reporting tools. The goal of these enhancements is to aid STRI in its fund raising campaigns as well as its internal reporting.

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
Phase 1			
Development	12/2006		12/2006
Test	01/2007		01/2007
Implementation	02/2007		02/2007
Production	03/2007		03/2007
Maintenance and adjustments	03/2007		12/2008
Phase 2			
Development	01/2010		03/2011
Test	06/2010		06/2011
Implementation	08/2010		08/2011
Production	10/2010		10/2011
Develop updated requirements	09/2012		

c. Benefits

The STRI VAS 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. The VAS will also aid in fund raising activities by facilitating the tracking of STRI research guests once they have finished their projects in Panama

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d. Status @ a Glance

Funding Status (FY12):	Fully Funded
X	Partially Funded
	Not Funded
Production Date:	2009, Phase 1
	2010, Phase 2
Enterprise Architecture:	Target Architecture
X	Candidate for Replacement
Units Supported:	<ul style="list-style-type: none">• STRI

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

Snapshot: Exhibitions, Outreach & the Web

LOB: Education (106); Knowledge Creation & Management (202)

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
<ul style="list-style-type: none"> Vista by Ticketmaster (NMAI) Meeting Room Manager (NMAI) Xert (NMAI) Info Tools (2011) Smithsonian Information Center (2011) 	<p><i>Target Architecture:</i></p> <ul style="list-style-type: none"> Mobile Applications TRAX Group Reservations & Event Management, NMAI Web Search Engine Web Content Management System Web Hosting Services Google Analytics WebTrends, HootSuite Access One Microsoft Surface Table 		

Future Considerations / Performance Gaps

- By leveraging internet technologies the Smithsonian can extend its reach globally for education, exhibition, and outreach; and remix and combine information in ways not possible within the physical constraints of the world in which we live.
- The growth of software as a service (SaaS) will continue to provide additional functionality to meet emerging opportunities for exhibition, education, and outreach.

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5.1 Exhibition Technologies

5.1.1 Mobile Applications

a. Description

The disruptive power of mobile is changing how we work, socialize, and connect with the people, places, content and activities that mean the most to us; leveraged strategically, it can be a positive force for unparalleled advancement of the Institution's mission, its Four Grand Challenges, and the core priorities of the Institution's 2010-2015 Strategic Plan.

- **Cellphones**

The high penetration of cellphones around the world, including in developing nations, represents an enormous but as-yet untapped opportunity for the Smithsonian to broaden access to its collections, research, and conversations with diverse communities who may not yet have Internet access through their mobile phones..

In 2010, a cellphone audio tour was innovatively combined with a mobile website and the Institution's first implementation of MS "Smart Tags" to create a multi-platform, mobile visitor guide to NMAI's "Vantage Point" permanent exhibition of contemporary Native American art on the Mall. SAAM, NPG and AAA continued their use of cellphone, innovating in their "call to action" for use of their tours by putting enticing questions on exhibit labels instead of simple (and uninspiring) telephone numbers for commentaries. The adoption of this advanced best practice by multiple units at the Smithsonian is a direct result of centrally-coordinated conversations among staff working on mobile and central repositories for mobile best practice.

One barrier to SI's use of cellphone voice and text message features is the per-minute and per-text message costs incurred by both the Institution and the user for such programs. This makes it difficult to budget for such projects, and also raises the possibility of projects being 'victims of their own success' if more people phone or text than planned for. NPG had this experience with their popular Lincoln exhibition cellphone audio tour in 2009. OCIO (SI Mobile) is now in conversations with a leading provider of cellphone services to obtain more advantageous pricing for the Institution's cellphone initiatives by leveraging economies of scale, rather than leaving each unit to contract separately for these services and therefore at a higher per-unit cost.

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- **Audio & Video Podcasts**

Nearly all units continue to offer at least one podcast series to their publics, and several offer a number of different podcasts.

Video podcasts or 'vodcasts' seem to receive more downloads than audio-only or 'enhanced' podcasts (combining audio with still images), and are proving to be more versatile in their platform compatibility: the same video that is podcast can be displayed on a website (mobile or fixed), in a YouTube Channel or Flickr Stream, in the popular ArtBabble art video portal if appropriate, and included in a multi-media tour or application. To continue to build on the strength of its podcasting program, the Smithsonian and its units should continue to invest in video production expertise, infrastructure and resources for hosting and content management.

- **Museum-Specific Audio & Multimedia Tours**

Interestingly the rise of mobile applications at the Smithsonian has increased desire to provide mobile devices on-site at the museum, e.g. an iPod Touch, so that all visitors can benefit from the app – not just those who come to the museum with a Smartphone. Cooper-Hewitt was the first Smithsonian unit to lend iPod Touches to visitors; followed by NMAI in New York. The Luce Center audio tour continues to be available to visitors who can borrow 10 devices from the information desk as part of the Center's audio tour program. In order to make their mobile interpretation truly accessible to all Smithsonian units will need to provide at least a small number of devices (e.g., cellphones, iPods, or 'traditional' museum audio tour devices) on-site for visitors who do not bring their own device or who are not able or willing to use it (e.g. foreign visitors and cellphone calls cost too much when roaming). As this service scales up, central coordination through OCIO will enable economies of scale and guarantee quality and consistency of mobile experience across the Institution.

- **Mobile Web**

The Smithsonian's mobile strategy recommends that wherever possible, a mobile website be at the core of all future application projects as well, since mobile web represents a platform and content that unit staff can more easily manage and keep up-to-date with in-house resources than cross-platform applications. OCIO is also working with OHR and the unit staff who have already created mobile websites to create seminars on mobile website development for staff, capturing best practice for further use. Drupal and HTML5 expertise will be increasingly important to supporting Smithsonian mobile web initiatives, and should be an area of further investment.

Perhaps the biggest challenge to mobile web developments will be better understanding how people use mobile websites, both on-site at and beyond. Is the small screen conducive or an obstacle for different kinds of

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research? What kind of interpretive content and social media functionality are most useful to our audiences? What kind of collections information and search capabilities are used on the mobile versus the larger fixed screen environments? Audience behavior is evolving in this regard, so ongoing research with concurrent reporting and discussion of the results among OP&A and the rest of the Smithsonian will be critical to our leveraging this important platform effectively.

- **Apps**

In addition to working offline (without a live Internet connection), applications can be used to do many things that are not possible with mobile web, and more than a dozen SI mobile projects in development aim to exploit these new tools for research and visitor services. Crowdsourcing, visual recognition of both shapes and text, GPS location, augmented reality and mobile 'collecting' of visitors' favorites at the Smithsonian are all mobile facilities that will be trialed in 2011 in both mobile tools and games. The challenge will be keeping these apps up-to-date with new phones and mobile operating systems.

The quality of the mobile experience rests on a thorough understanding of our audiences' needs and interests and the educational and interpretive approaches chosen to respond to them. Although discussed here after the technical considerations, the design of the mobile experience and content is more critical to the mobile visitor's satisfaction than the technology. Neither a killer app nor ubiquitous WIFI can make the mobile Smithsonian a compelling experience and valued resource if the content they deliver is lacking. Of arguably greater importance is the pacing, the tone, the delivery and overall design of the mobile encounter with the Smithsonian. Both individually and collectively, the Smithsonian's units will need to analyze and test with users what experience design and content – whether authored by the Institution, by third parties, or 'user-generated' – responds to the mobile visitor's demands. To this end, a central "Skunkworks" – resourced with not just technical expertise, but also educational and interpretive best practices, supported by comprehensive audience research and usability testing - would help us develop and iterate applications and provide a dedicated, continuous usability lab for ongoing innovation.

To ensure the maximum use and return on its content investment, the Smithsonian is developing with other leading cultural institutions standards for mobile content and data management. These schema will enable content to be ported across platforms and generations of apps more easily, so that units don't have to 'start from scratch' in building every mobile product and experience.

Equally critical to the advancement of SI Mobile is the provision of free public wifi throughout the Institution's facilities. This will enable us to reach audiences who cannot or will not use cellular networks (due to roaming costs

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or using a wifi-only device), and also support more media-rich mobile experiences that require more and faster bandwidth.

b. Benefits

Over the five-year planning period, industry experts predict a convergence of wireless data and computing to provide pervasive computing that will give visitors anywhere, anytime, any device access to Smithsonian information – particularly through new breeds of smart telephones and emerging mobile computing platforms. Some analysts predict that by 2020 or even as early as 2013, the majority of Internet access will be through mobile devices. To achieve the Smithsonian’s strategic goals, specifically of Broadening Access, the Institution needs a strong mobile strategy and cross-platform offering. Mobile devices are predicted to be the main platform for accessing the Internet by 2020.

c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2010
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

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5.1.2 Microsoft Surface Table

a. Description

The Smithsonian Institution is using Microsoft Surface Tables in its museums to provide an enhanced interactive experience to complement the exhibits. The Surface Table is a multi-touch /vision system that responds to hand gestures and objects and enables the museum visitor to interact with digital content in a simple and intuitive way. The Surface Tables, due to their large size, make it easily possible for multiple museum visitors to interact and collaborate with one another and virtual surrogates of objects simultaneously on the same Surface Table.

Museum's implementing this technology must develop custom applications to meet their unique exhibit / object needs. The goal is that these applications will be developed such that they can easily be shared and repurposed by other Smithsonian museums using core development architecture as customized experiences that are interactive and entertaining. This will allow for other Smithsonian organization to build off the framework that has already been tested and modify it to suit their specific Surface table application development efforts.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Procure Surface tables (quantity 7)	09/2009		09/2009
Develop custom applications:			
NMAH's Timeline of American History	11/2009		11/2009
Test Platform in partnership with the University of Maryland	02/2010		02/2010
FSGA's Viewing Entire Lengths of Extremely Long Scrolls	03/2011		03/2011
Castle's Light Exhibit	07/2009		10/2010
NPM's Binding the Nation	09/2010		09/2010
NMNH's Plant Diversity	07/2010		07/2010
NMAH American Stories	05/2012		

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c. Benefits

The benefits for using the surface table as a new delivery method to provide content to Smithsonian visitors includes:

- Creating an interactive environment for visitors to not only see the museum content but actually experience, touch and share the content.
- Creating new methods that utilize the virtual and web environments; and enabling users to learn about the Smithsonian exhibits displayed throughout the museum, as well as those currently off-display.
- Engaging youth and attracting them to learn about the content at the Smithsonian as active participants.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded		
		Partially Funded		
		Not Funded		
Production Date:		2010		
Enterprise Architecture:	X	Target Architecture		
		Candidate for Replacement		
Units Supported:		• CASTLE	• OCIO	• NPM
		• FSGA	• NMAH	• SAO

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5.1.3 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
Develop High Level Architecture	08/2004		08/2004
Develop Requirement Specification	02/2005		02/2005
Data evaluation & clean-up	09/2005		09/2005
Data migration	05/2006		12/2006
Develop custom reports	08/2006		11/2006
Test security, disaster /recovery	09/2006		12/2006
Implement training strategy	09/2006		12/2006
Acceptance testing	10/2006		12/2006
Enhance 42 CIS reports	10/2009		09/2008
Integrate TRAX data with EDGE	04/2008		03/2008
Integrate Congressional District	10/2009		11/2008
Integrate SITES Poster Shows in TRAX	02/2009		02/2009
Implement USI's Document Mgmt	05/2009		05/2009
Upgrade TRAX to Release 17	06/2009		06/2009
Upgrade TRAX Server Hardware	12/2010		11/2010
Upgrade TRAX to Release 19.2	03/2011		02/2011
Implement interface between FileMakerPro and TRAX	10/2009		03/2011
Document Interface and operational procedures	10/2009		03/2011

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Upgrade Ungerboeck software to version 19.40	09/2012		
Test over 100+ custom Crystal Reports and Custom interfaces (FileMaker Pro and EDGE)	09/2012		
Install Web server into Herndon Data Center	03/2012		
Install Ungerboeck version 20.x in a sandbox test environment	09/2012		

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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2007
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SITES

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5.2 Visitor Support

5.2.1 Access One: Exhibitions & Encyclopedia Databases

Staff use *Access One Exhibitions and Encyclopedia Databases*, a custom-developed web application and SQL database backend system, to track exhibitions and online website resources. This information is published on the website www.si.edu, and is available for query by other systems and websites. It is also used internally for managing upcoming and past exhibition information, and the metrics dashboard.

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2010
Enterprise Architecture:	x	Target Architecture Candidate for Replacement
Units Supported:		• OVS • OPA

5.2.2 Group Reservations & Event Management: NMAI

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.

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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 was 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.

During Phase IV, elements of the web-based iEBMS system were implemented. This web-based front end to EBMS is part of our current contract with EBMS and gives the expanded capability to have staff view meeting room information via a Web browser via the NMAI Intranet. We evaluated implementing the iEBMS software on our Internet website; however, we found that the Smithsonian-centrally funded calendaring software, Trumba, was a better solution. Therefore, we do not have any current plans to use iEBMS on the NMAI website for calendaring functions. Also during Phase IV, we worked to expand the system to include additional users and worked with the GGHC to document their requirements for enhanced system event management tool use.

In FY2010, we enhanced reporting capabilities to improve and expand statistical reporting and refined the raw reporting tools utilized by the system's end users, importing additional contact information, and are continuing to evaluate whether EBMS is a viable tool to meet additional NMAI data and reporting needs.

In FY2011, we migrated targeted data (contact and historical information on organizations and individuals) from NMAI's retired Xert system into EBMS. We also configured EBMS to allow for the capturing of information about NMAI's non-donor-related outreach and interactions with its constituents - current as well as back data collected by the Cultural Liaisons office and eventually others.

We included EBMS data in a new "Master Search" tool designed to quickly and simply inform certain NMAI staff about the existence of an individual or organization in NMAI databases to facilitate communication within and among various NMAI offices/units – to increase opportunities for the 'right hand to know what the left is doing'.

In FY12, we plan to roll out a web-based EBMS statistical reporting tool and we will evaluate the feasibility of moving to a web-based EBMS solution (version 20). (The current system is client-server based.)

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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			
functionality and features for GGHC	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	on hold	
Implement for NMAI-Mall public spaces by Special Events	04/2008		04/2009
Migrate data from Meeting Room Mgr	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		05/2009
Expand GGHC's use of event management tools	09/2009	9/2012	
Phase 5: Enhance Functionality and Availability of Data			
Enhance GGHC's use of EBMS for postal mailings and e-blasts	02/2011		02/2011
Implement Master Search w/ EBMS	04/2011		04/2011
Import Media Initiatives postal and email mailing lists into EBMS	05/2011	On hold	
Migrate Xert data to EBMS	09/2011	9/2013	
Implement Intranet-based internal room booking for Mall and CRC staff meeting rooms.	10/2011		10/2011
Implement intranet-based registration, tracking and reporting of staff service hours	10/2010		10/2011
Revise/expand staff service hours process in support of new NMAI service hours requirements	10/2012		

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Generate automatic email reminders of upcoming room reservations to meeting coordinators	04/2012		
Implement Intranet-based internal room booking for GGHC staff meeting rooms.	05/2012		
Expand intranet-based room booking to allow for generation of HEAT requests for IT/AV support	05/2012		
Evaluate feasibility of moving to v20 web-based solution	09/2012		
Importing GGHC Film and Video Center mailings lists	12/2012		
Expanded statistical reporting available via Intranet		ongoing	

c. Benefits

Use of the Group Reservation & Event Management system allows 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.

Staff in other units/offices are able to better manage, document and share information about their interactions with NMAI constituents thus helping facilitate communication among NMAI staff. Being able to readily access historical information about NMAI's involvements with its constituents will positively impact current and future museum projects.

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d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2005
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• NMAI

5.3 Web

5.3.1 Web Hosting Services

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 2011 continued the migration of web sites to the 64 bit, Windows 2008 clusters acquired in FY 2010. VMWare's vSphere 4.1 and vCenter 4.1 were brought into production allowing WSD to virtualized many of the expired web servers that were hosting legacy content that could not be migrated to the newer platform. Virtualization allows WSD to continue to host these legacy sites until they are converted or retired. New open source projects such as Drupal and Wordpress were also installed on virtual servers.. These actions were taken as a continued ongoing effort to enhance the Institution's web hosting services.

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.

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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		06/2009
Consolidate SQL server support	07/2008		08/2010
Support NMNH in server consolidation*	09/2009		03/2011
Establish 2 new 64-bit SQL 2008 clusters	11/2009		02/2010
Support SAAM in public Web migration to central supported servers	05/2008		11/2008
Provide Web Content Management development support to Museums and Units	12/2010		12/2010
Provide Google development search support to Museums and Units	12/2010		12/2010
Implement and support Web 3.0 technologies	12/2012		
Provide testing infrastructure for Web Content Management System	12/2010		08/2010
Provide testing infrastructure for websites	12/2010		08/2010
Migrate TeamSite to new server**	03/2012		

* NMNH's Global Volcanism Program's volcano.si.edu website was the last site consolidated and entered production on the Cold Fusion 9 Cluster in March 2011.

** New Teamsite production server, si-wcm06 will be brought online by end of February 2012.

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;

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- 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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2005
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

5.3.2 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.

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c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2004
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

5.3.3 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.

In 2006, a Google search engine was deployed for use with the public 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

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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.

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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. 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. Prior to 2006, 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 previous approach resulted in incomplete, inconsistent, and overall poor search results as users move from Smithsonian sub-site to Smithsonian sub-site.

c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2006
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

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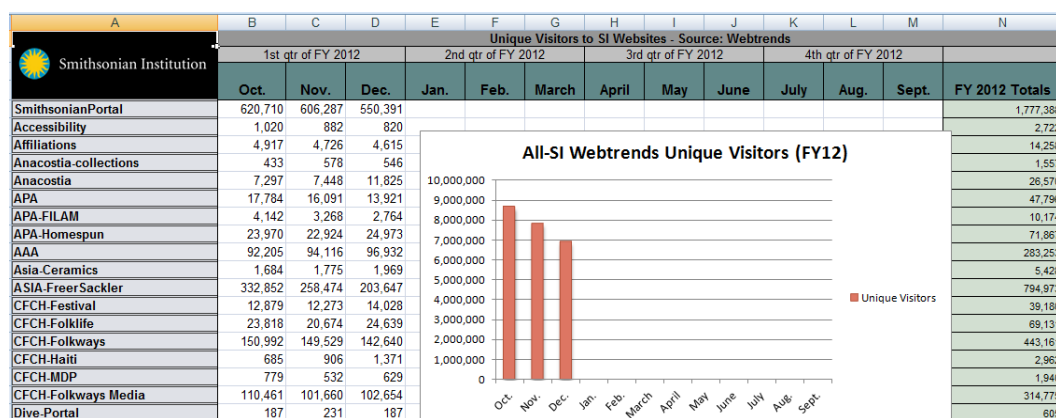
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5.3.4 Web Analytics: WebTrends

a. Description

All Smithsonian units use Webtrends “profiles” to gather basic traffic statistics and to create customized reports on activity of their websites. As a result of decisions resulting from the SI Redesign project, trended website “unique visitor” statistics are compiled monthly by the Office of the Chief Information Officer in a single report, partially illustrated below:



b. Benefits

Web analytics software generally collects data in two ways. The oldest method dates back to the Internet’s origins, and is called logfile analysis. Logfile analysis is literally the parsing of data based on the huge logfiles created by webservers when any website activity occurs. The Institution’s Webtrends implementation is largely based on logfile analysis. Due to technical considerations involving server and browser caching, logfile analysis is a limited methodology for tracking visitor-related data.

The other way web analytics software (including Webtrends and Google Analytics) collects and reports data using JavaScript (JS) tags placed on website pages. These tags are non-executable text code placed directly on web pages work in conjunction with small, invisible “single-pixel” images that enable the software to discern a wide range of website activity. In Webtrends’ proprietary nomenclature these are called *SmartSource Data Collector*, or “SDC” tags.

Though javascript analysis is ultimately a more precise measurement system, it is also more resource intensive to implement and maintain. As a result, the majority of the Smithsonian’s Webtrends implementation continues to be based on logfile analysis. Some units also utilize the SDC/javascript method however, and Webtrends SDC profiles are provided upon request. . For a large enterprise such as Smithsonian however, with websites regularly coming online and being taken offline, logfile analysis is a reliable way

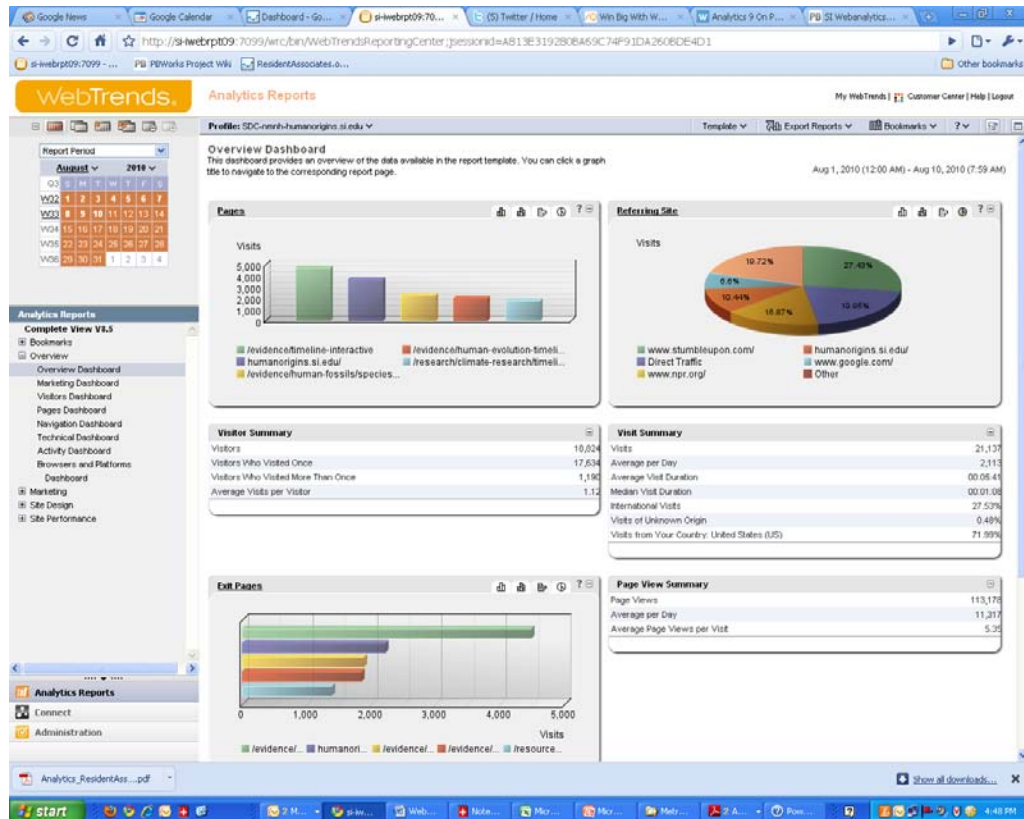
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to provide consistent, apples-to-apples statistics over time, that also respects the limited resources available both within OCIO and the individual units.

The Smithsonian chooses to host and maintain the Webtrends internally providing a number of advantages (including solution cost), but which places the responsibility to maintain and program the software in the hands of SI's internal resources. In addition to spreadsheet-exported reports, Webtrends offers data in a browser-accessed "dashboard" format providing multiple options for analysis. All Smithsonian websites have a basic dashboard setup. An example of a Webtrends dashboard (for the Human Origins website), is shown below:



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c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		1995
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

5.3.5 Web Analytics: Google Analytics

a. Description

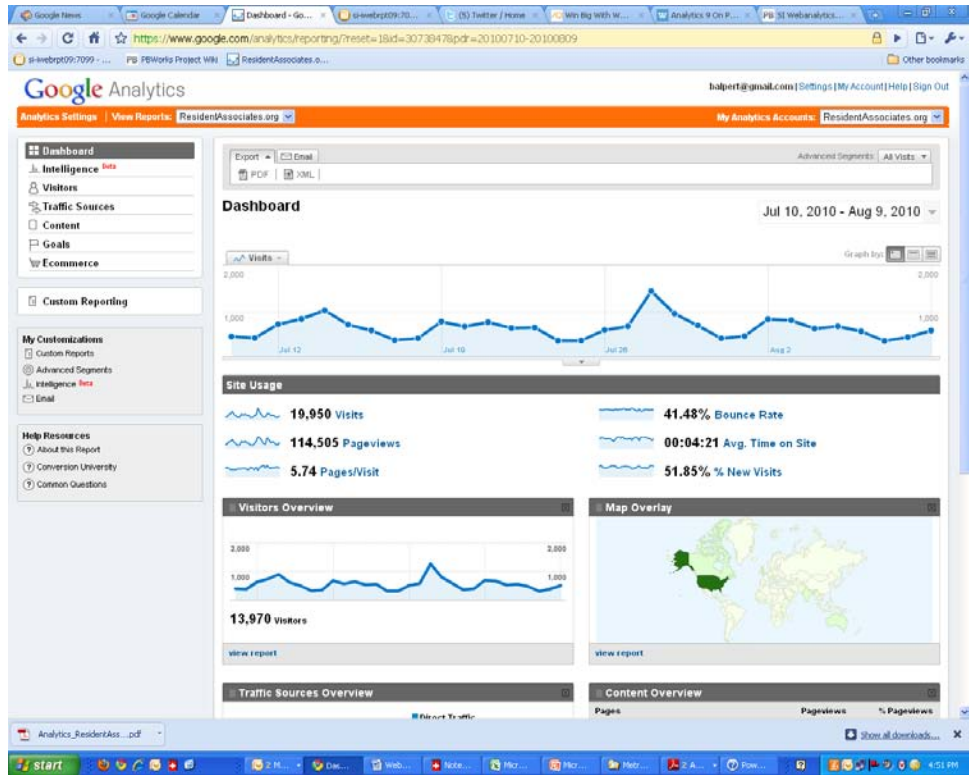
Google's free web-based website analytics package, "Google Analytics" (GA), is popular at the Institution and is used to measure many Smithsonian websites, often in conjunction with the other commercial analytic packages. Google Analytics is recognized as a flexible, easy-to-use tool which provides web practitioners with much of what they need to measure, especially given the amount of time they have. GA is a JavaScript-based solution and so requires JS-tagging for any page one desires to measure.

Like Webtrends, Google Analytics offers advanced abilities such as tracking conversion goals and creating advanced segments. In GA, much of this functionality can be implemented by users from their browser with minimal customization required, as shown in the sample below for TSA's ResidentAssociates.org website.

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b. Benefits

Google Analytics's primary attraction lies in its ease of use and out-of-the-box incorporation of powerful features such as advanced segmentation.

c. Status @ a Glance

Funding Status (FY12):	X	Funded Partially Funded Not Funded
Production Date:		2005
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

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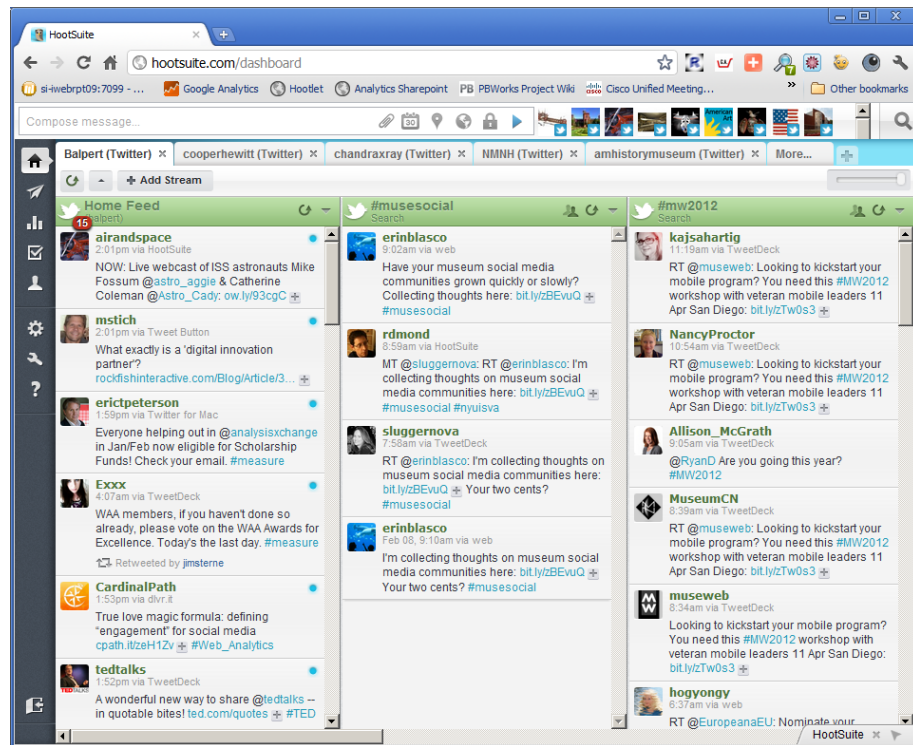
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5.4.6 HootSuite Enterprise Social Media Management Tool

a. Description

HootSuite is a web-based social media management and measurement tool which enables SI's practitioners to perform a variety of social media management and reporting tasks from a centralized interface. By logging-on to the HootSuite dashboard (pictured below), unit practitioners can monitor and post to multiple social networks, including Facebook, Twitter, and Google+; and to manage and measure the output relating to those accounts.



The HootSuite dashboard displays multiple social media "streams."

HootSuite's "Enterprise" plan provides a host of content management capabilities, such as enabling teams to strategically schedule and manage social media output (e.g., scheduling Twitter tweets and Facebook posts, or publishing content via permission-based workflows), and other practical advantages such as enabling teams to contribute to multiple social profiles without sharing passwords. Other capabilities include assigning messages for follow-up and tracking responses, enabling SI teams to engage with their audiences personally and efficiently.

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HootSuite's built-in analytics enables the creation of custom reports from over 30 individual report modules, making possible such measurements as brand sentiment and follower growth, as well as incorporating multiple measurements directly from Facebook's "Insights" measurement platform, and website measurements from individual Google Analytics accounts.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
HootSuite Acquisition	07/2011		07/2011
HootSuite Launch	10/2011		10/2011

c. Benefits

HootSuite's robust capabilities provide the Institution with the means to aggregate measurements from hundreds of disparate social media accounts, enabling these measurements to appear in the SI Dashboard.

d. Status @ a Glance

Funding Status (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	2011
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

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

Snapshot: Exhibitions, Education, Outreach & the Web

LOB: Education (106); Knowledge Creation & Management (202)

Retired	Production (2011)	Planned (2012 to 2015)	
		Funded	Unfunded
Sharepoint WSS	<i>Target Architecture:</i> <ul style="list-style-type: none"> EDAN si.edu Public Website Prism Sharepoint MOSS (internal) 		<ul style="list-style-type: none"> Smithsonian Commons Sharepoint MOSS (external) EDAN (Phase 2)

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.
- The internet is continuing to evolve into a participatory and social networking environment that will extend beyond today's Web 2.0 technologies with collaborative technologies and active participation by a community of users.

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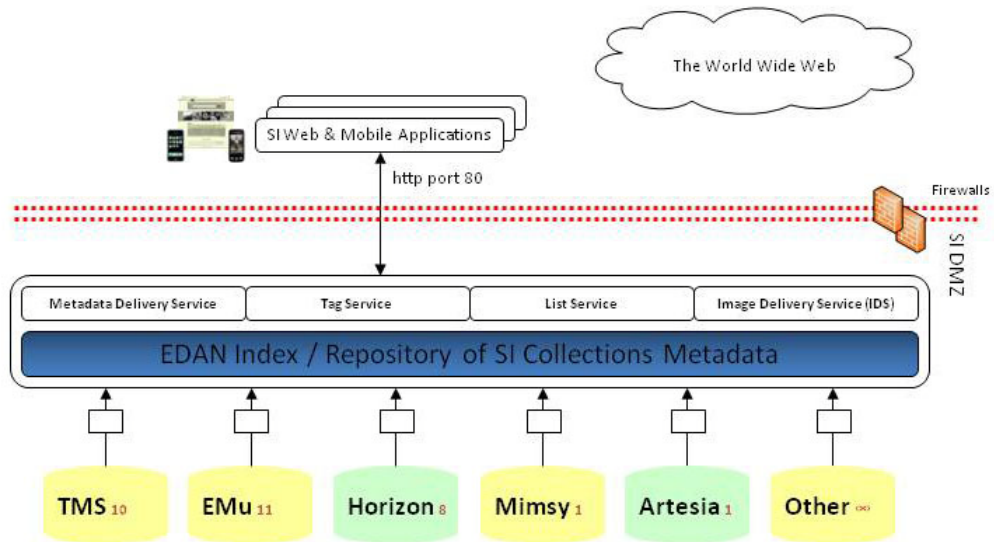
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6.1 Enterprise Digital Asset Network (EDAN)

a. Description

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 associated digital assets for objects held within the Smithsonian's major collections, library, and archive systems through a single shared access middle-layer. The Smithsonian is implementing EDAN in a phased manner as funds become available.



Until 2009 with the launch of EDAN, the Smithsonian lacked any way of providing the public, researchers, and staff a unified view of its collections and associated digital assets. Because of the federated nature of the Institution and its then collections data architecture, those searching for digital information and assets had to know which Smithsonian unit held an object and (often) in which collection system the object resided, regardless of whether the inquiry was being made by a scholar, the general public, a curator, or a scientist.

By leveraging EDAN Smithsonian staff may prepare websites, mash-ups, and/or mobile applications that incorporate collections objects without having to create derivative databases and images—a limitation of the previous collections data architecture. EDAN helps to maximize the use of limited storage space and more importantly it preserves the connection between the digital asset and its primary system of record maintaining data synchronization and integrity of the metadata (e.g., description, copyright, restricted uses, and provenance information).

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In the first phase completed at the end of FY 2009, the EDAN project successfully:

1. Developed a metadata model to index collection object record metadata pushed from major Smithsonian collections systems to enable search and retrieval from one location.
2. Designed, developed, and launched a:
 - a. Collection Data Ingest Process
 - b. Metadata Delivery Service (MDS)
 - c. Image Delivery Service (IDS)
 - d. Tag Service
3. Developed and implemented a preliminary high-level storage architecture for the Smithsonian's Digital Asset Management System (DAMS) in support of the IDS component(s) of EDAN.
4. Retrieved images flagged for public access in the CISs and the DAM using the Image Delivery Service.
5. Implemented the public-facing Collections Search Center implemented using EDAN (<http://collections.si.edu>).
6. Partnered with the Smithsonian Photography Initiative (SPI) as they re-architected their website to leverage the EDAN Phase 1 services. SPI's re-built site is the initial proof-of-concept and production example of EDAN.

During FY 2010 the number of records indexed by EDAN increased to over 5.4 million with over 430,000 digital assets pulled from 25 Institutional datasets. A List Service was developed and launched; the metadata model was extended to include object location supporting items physically on display at museums; the Collections Search Center website / application was enhanced with mobile extensions so that it provides automatic sensing and support for smart phone devices, specifically iPhones and Androids; an EDAN "widgets" code creation website / applet was created to allow non-technical unit staff to build and imbed EDAN-driven image viewers, slideshows, image grids and the like into their sites; and two non-published proof of concept iPhone applications were developed demonstrating both search and display of EDAN data and images by a mobile application using the MDS, IDS, and List Service(s).

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During FY 2012 the number of major CISs / datasets ingested into EDAN grew from 25 to 35 (all SI museums but one). The number of object records indexed by grew from 5.4 million to 7.4 million. The number of digital assets linked grew from 430,000 to 565,000. EDAN geo-location capabilities were improved and several Google Map mashups were developed highlighting collections. This was assisted by a Smithsonian Web 2.0 grant which was applied for and obtained. EDAN support for collections currently on display was improved. An EAD (encoded archival description) Lucene index structure and set of processes was created, linked to EDAN and is now used by SIA's website. A public tagging feature was added to the Collection Search Center as a pilot project in cooperation with several Institution museums and archival units. CSC usability studies were conducted through Foresee surveys and OP&A, setting the groundwork for further system enhancement. Upgrades were made to the EDAN back-end infrastructure. Support was provided to numerous SI web and mobile projects, in particular SIA's redesigned website, the Steinway Diaries project, and the Smithsonian mall Mobile application.

Future work will concentrate on ingest of collection data from the remaining major Smithsonian collections information system enhancing existing data and services through work with Smithsonian SD-600 collecting units, enhancing the functionality of the CSC by acting on information gained through Forsee surveys and OP&A analysis and fully implementing the public tagging functionality piloted in FY2011, and partnering with Smithsonian museums, research institutes, and offices on projects that leverage EDAN data and services. At the same time, the project team will work to solidify and enhance the EDAN infrastructure.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Phase 1:			
TRB Requirements Review	12/2008		12/2008
TRB System Design Review	04/2009		05/2009
TRB Production Readiness Review	09/2009		09/2009
Deploy EDAN Phase 1 system	10/2009		10/2009
Phase 2	TBD		

c. Benefits

EDAN provides web and mobile applications with a unified view of SI collection objects including methods for accessing data on and related digital assets for those collections. Through EDAN, 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. Collection metadata and digital assets, unlike their primary physical object can easily be disseminated through the Internet; whereas a

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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 and encourages intra-Institutional partnerships. 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 (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	2009 (Phase 1)
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

6.2 *si.edu* Public Website

a. Description

The prevailing public perception of the Smithsonian is that of a single entity bestriding the National Mall with doors thrown wide to the world. Yet the Smithsonian's current collection of websites paints a somewhat more true to life portrait of a myriad of associated museums, collections and research units that often share little more than a common sunburst logo and for whom the publicly accessible collections on the Mall is but the tip of the iceberg. While the Institution's Web content is rich and extensive, we do not have the infrastructure in place to provide a single, comprehensive search experience for all of its web-accessible content through a comprehensive and elegant user experience. At the same time there is a valid tension between providing a common user experience and maintaining the unique personality of our unit websites reflecting their unique content customized to their stakeholders' needs.

In recent years we have made great strides towards providing a balance between these two needs by implementing a pan-Institutional Google Search Appliance technology;

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implementing the first Institution-wide calendaring system (Trumba¹) which provides functionality for each unit to define and share their current internal and external-facing events with the rest of the Institution and the public; and implementing Site Maps throughout the Institution, empowering the most popular search engines to find their way into our vast collection of databases and to share that content with the world. In December 2010, we finalized a 15 month, Institution-wide collaboration that resulted in a brand new, socially-savvy Main Smithsonian website.

The objective behind major reengineering of our collections and event search, as well as our main portal at smithsonian.org is to continually refresh and refine access to the underlying content accessed via our plethora of sites by providing user-friendly experiences that reflect the generational changes that have taken place in our web-based audience since our last redesign ten years ago. This new presentation layer for our existing content gives increased prominence to all of the Smithsonian-wide engagements with Social Media and other major content developments since 2001, such as bringing attention to our increasing inventory of highly interactive and engaging websites. The new site is accessible to the growing number of mobile devices hitting the market while also achieving Section 508 Accessibility requirements. An added benefit of this project was the modernization of OVS's exhibition database and the creation of a database to support the *Encyclopedia Smithsonian*. Both of these major enhancements help to bring us one step closer to having a truly federated search of all of Smithsonian Web Content. Social Media widgets are being exploited to aggregate Institution-wide material in a compact 2.0 presentation that shines the best light on our pan-Institutional efforts.

With the winds of these successful endeavors at our backs, we ventured forward with the creation of an Institutional presence that will serve as an inspiration for our patrons as well as other cultural institutions, putting the Smithsonian's online presence in the same sphere as our real-world reputation as was later evident with the site won the prestigious 2011 Webby Award for People's Choice in the Cultural institution category..

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Trumba Calendaring Service	09/2009		09/2009
SI.EDU Website Refresh			
Formed Content Advisory Team	12/2009		12/2009
Analysis Phase	03/2010		06/2010
Design Phase	05/2010		09/2010
New Site in Production	08/2010		12/2010

¹ With the exception of NASM, Smithsonian units enter their events directly into Trumba or through an automated feed.

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c. Benefits

The redesign of the existing main www.si.edu Web site achieved its goal to create the NEW Smithsonian online experience (Goal 4: Audience; Smithsonian Web & New Media Strategic Plan), and to change it from what was primarily a broadcast mechanism (one directional only) to a participatory and lively community of Smithsonian visitors (multi directional). Metrics collected to date have shown that today people primarily visit the Smithsonian website to plan their visit to our physical museums and as such this information is featured more prominently on the home page of the site. Objectives behind the redesign of the core www.si.edu website were to engage a larger more diverse global audience, and in doing so create a website capable of interfacing with and utilizing cutting-edge technologies such as social media and smart phone applications—while relying on the existing hardware and software infrastructure.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2010
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• OPA • SI-wide

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6.3 Smithsonian Commons

a. Description

In the summer of 2009 the Smithsonian created a Web and New Media Strategy [<http://smithsonian-webstrategy.wikispaces.com/>] that describes an *updated digital experience*, a new *learning model* that helps people with their "lifelong learning journeys," and the creation of a *Smithsonian Commons*—a new part of our digital presence dedicated to stimulating learning, creation, and innovation through open access to Smithsonian research, collections and communities.

The initial Smithsonian Commons will be a Web site (also designed for mobile devices) featuring collections of digital assets contributed voluntarily by the units and presented through a platform that provides best-of-class search and navigation; social tools such as commenting, recommending, tagging, collecting, and sharing; and intellectual-property permissions that clearly give users the right to use, re-use, share, and innovate with our content without unnecessary restrictions.

The architecture of the Smithsonian Commons will encourage the discovery of content deep within Smithsonian unit Web sites and will expose connections and commonalities across Smithsonian projects. The Smithsonian Commons will also be a platform for formal and informal collaboration and content sharing inside and outside the Institution. Through these features—collection access, sharing, social tools, and user-generated content—the Smithsonian Commons will bring together the component pieces of the updated experience, updated learning model, and balanced approach to management and governance that are the foundational themes of the Web and New Media Strategy.

Incremental Development. The Smithsonian Commons will be developed incrementally through a series of prototypes and public pilot projects designed to test and refine business models and impact on mission and audiences. The first of these pilot projects has already taken place: The Smithsonian's participation in the Flickr Commons project demonstrated the potential of providing open access to multiple Smithsonian collections through a best-of-class social-media platform, and collections.si.edu demonstrates the power of providing a single point of access to Institutional collections and the increase in traffic that such utility creates. The Smithsonian's SharePoint project and intranet redesign are demonstrating the positive effects of an improved end-user experience and a shared collaboration platform on information access and internal collaboration.

The first iteration of a Smithsonian Commons could be as simple as images of a few carefully chosen Smithsonian artifacts with links back to their collecting units and labels that clearly give the public permission to use and share the images however they see fit, as long as the Smithsonian is properly credited. Additional features such as commenting and collecting, and experiments with micro-donations, e-commerce and sponsorships, will be added one at a time and designed so that they could be used not just on the commons but independently throughout Smithsonian Web sites. Some tools will be developed to help non-Smithsonian bloggers, researchers, educators, and enthusiasts expose Smithsonian content on their own Web sites.

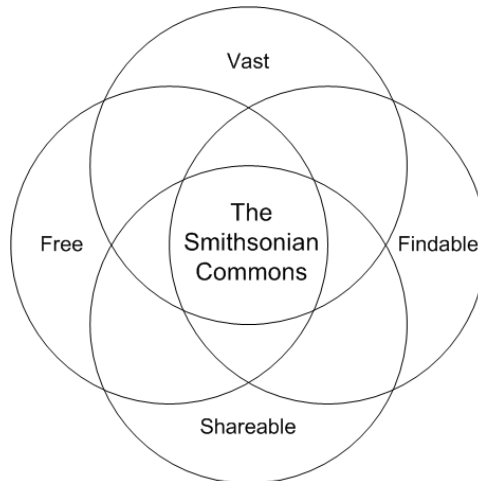
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Prototyping the End-User Experience. A clickable interactive prototype of the Smithsonian Commons was developed in FY 2010 to help the Smithsonian community understand and discuss the attributes and benefits of the Smithsonian Commons in terms of its impact on real users. The prototype project was a rapid, research and development process taking place over 12 weeks.

The prototype demonstrates the four core attributes that, together, give the commons concept power and make it unique on the Web: the Smithsonian Commons will be vast, findable, sharable, and free. The prototype helps visualize how these attributes reinforce each other in a virtuous cycle, how they impact the ways that people will interact with the Smithsonian, and how they advance strategically important outcomes for the Institution. These attributes are emphasized and discussed throughout the Smithsonian Web and New Media Strategy and the Smithsonian Institution Strategic Plan for FY2010-2015.



Smithsonian Commons: Vast, Findable, Shareable, and Free.

- *Vast* ...Anyone in the world can have access to the whole Smithsonian, including access to deep collections and the vitality, curiosity, and creativity of our staff, visitors, partners, and our extended global community. The Smithsonian is shown as the center of an amazing network of ideas, collections, and people. No other institution can offer so much to so many.
- *Findable*...Vastness and findability go hand-in-hand. The vastness of the Smithsonian can be discovered because search, navigation, and overall user experience design enables people to find the content they're interested in, in the ways they expect to find it, including through recommendations and comments by staff and visitors, external search sites, and social networks.
- *Shareable*...Sharing is the foundation of collaboration and learning. The Smithsonian's impact can be greatly amplified if what we have and what we do is easy to share. The Smithsonian Commons will encourage use and re-use for

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work and pleasure, in social networks, on mobile phones, and in the classroom, workshop, and laboratory.

- *Free...*The Smithsonian is built on the idea that the tools of discovery and knowledge creation should be available to all: the Smithsonian Commons will be built on the premise that free, high-quality resources will spread further and create more good in the world than those that are restricted by unnecessary fees and licenses. A popular and thriving Smithsonian Commons, built with revenue-generation in mind, will open up new business opportunities and drive increased traffic to our core e-commerce and membership offerings.

Public Response to the Smithsonian Commons Concept. The Smithsonian Commons prototype was open to public comments from June through December, 2010. During this time we received 1,225 comments and votes (in support for the commons concept, or against it) from the public. Over 70,000 words of commentary were received, and 97% of all responses voiced support for the project.

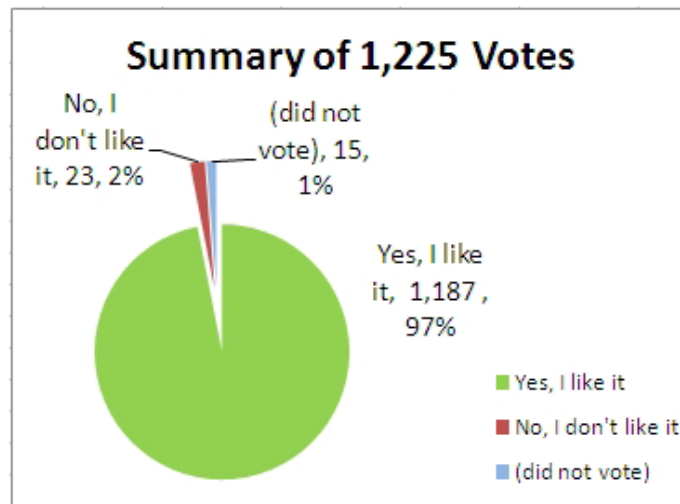


Table (above): Summary of public votes received on the Smithsonian Commons prototype.

This comment is typical of those supporting the commons project:

I was just taken in by all the wondrous advantages of what can be done to enjoy the Smithsonian from my home. (I live in Michigan) Which means, that the time I visited the Smithsonian back in the 60's now can be mine to enjoy again and again. The fact that you have included new concepts and applications shows your forward thinking. Thank you for bringing the Smithsonian to ME!!

Comment #871, received 8/5/2010

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In addition to public comments submitted through the prototype website we received a number of statements of support from technology luminaries and noted authors and thought leaders:

The Smithsonian Commons opens the door to not only the museum's incredible collections, but also to conversations, discoveries, and insights that until now have simply not been possible. Open to anyone, using any device, it will put the nation's museum in the palm of your hand.

More comments on the Commons are online at:

<http://www.si.edu/commons/prototype/comments.html>.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Phase 1: Initial Prototype— demonstration of concepts and end- user experience	02/2010		02/2010
Commons Charter Approved	02/2011	10/2012	
Project is funded; Begin Phase 2: <i>Startup</i>	10/2011	10/2013	
Launch Beta	04/2012	02/2014	
Begin Phase 3: <i>Full Development</i>	04/2013	02/2015	
Smithsonian Commons reaches 100 million items; Begin Phase 4: <i>Transition</i>	04/2016	02/2018	
Begin Phase 5: <i>Steady State</i>	04/2017	02/2019	

c. Benefits

Reshaping our digital identity around the concept of a Smithsonian Commons addresses many of our fundamental challenges.

- **Brand:** The concept of a commons brings cohesion and clarity to the Smithsonian's vast online offerings.
- **Audience Growth:** Through the Smithsonian Commons we can seed the Internet with high-value content and use social networks to increase the relevance and value of our work. Audiences—especially digitally savvy audiences and younger visitors—will immediately understand and respond to the idea of a free Smithsonian Commons. Improved content, features, and clarity can drive audience growth.
- **Unified Operations:** A voluntary Smithsonian Commons built on transparency and trust—and supporting rather than competing with the works of the individual units—provides an excellent alternative to working in silos.

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- **Education:** Planning next-generation learning programs is an Institutional priority. A commons can serve both as a collaborative workspace used to create learning programs and a clearinghouse to distribute and improve them.
- **Research:** Smithsonian researchers need private, semi-private and public collaboration and information-access platforms to advance and share their work. Aggregating these services into a commons provides a stable base and opens the door to new kinds of cross-disciplinary investigations.
- **Leadership and Legacy:** Championing free and open content and asserting the critical role of public institutions in stimulating innovation and knowledge creation would define the Smithsonian as a leader. Science, education, creativity, and civic discourse are all headed towards a participatory commons model.

d. Status @ a Glance

Funding Status (FY12):	Fully Funded Partially Funded X Not Funded
Production Date:	TBD
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

6.4 SharePoint

a. Description

SharePoint is a collaboration and information management tool that can help individuals and teams work together and share information through a common online portal. Windows SharePoint Services (WSS) was piloted in early FY 2009 to learn best how the technology can be applied at the Smithsonian. After which based on a technical evaluation and the donation of SharePoint (MOSS 2007) --- needed for its enhanced features—the decision was made to fully implement SharePoint at the Smithsonian for internal use.

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.

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A number of Smithsonian museums and departments had 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 information 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, Req'ts Definition, High Level Architecture	11/2007		11/2007
TRB Requirements Review	11//2007		11/2007
System Design Document & TRB	01/2008		02/2008
System Testing & 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	02/2009		02/2009
Requirements and HLA Review	02/2009		05/2009
System Design Review	03/2009		10/2009
System testing and Prototype Review	04/2009		11/2009
System Operational	05/2009		12/2009
Migrate content from old WSS environment	05/2009		04/2010
Migrate current SI Intranet (PRISM) to SharePoint	05/2010		05/2010
Install and Migrate to SharePoint 2010	09/2012		
Migrate existing museum and department sites to SharePoint (participating museums and units only)	09/2013		
Install and implement My Sites	08/2012		
Install and Configure Project server 2010 with SharePoint 2010	10/2012		
Install and Configure SharePoint Extranet for internet use	TBD		
Electronic Forms conversion to Sharepoint	TBD		
Provide Dashboards and Mash-ups Functionality	TBD		

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c. Benefits

SharePoint allows users to be more productive when working together on documents, tasks, contacts, events, and other information.

- 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.

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 leveraged 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 (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	2008 (WSS version) 2010 (Moss 2007 version)
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

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6.5 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 2012, PRISM was redesigned on the Microsoft Office SharePoint Server 2007 platform with the following objectives to be accomplished in a phased approach over the planning period.

- 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: During FY 2009 and FY 2010, the primary Collaboration framework and PRISM redesign was re-invented entirely on the SharePoint platform. In 2012 – 2013, SharePoint 2007 will be migrated to the newest version: SharePoint 2010 and PRISM and all Collaboration sites will be migrated to that platform. The delivery of the redesigned intranet is occurring in two major phases:

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- Phase 1 – “PRISM 2.0” in SharePoint:** Consists of a complete redesign of the navigation, look & feel, and taxonomic structure of PRISM, including high level content, OCIO site redesign & migration, Smithsonian Directives, forms, policies, and high-level support sites for most functional areas (including Facilities, HR, Safety, and Security). Also 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 committee sites.
- Phase 2 – “PRISM 2.5”:** OCIO will continue to work with units to redesign and migrate unit PRISM sites to SharePoint. Functionally, PRISM will also be enhanced 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		03/2009
High-Level Architecture	02/2009		03/2009
Prototyping & Usability Analysis (iterative)	04/2009		06/2009
Plans for Security, Operations, Backup, Administration	03/2009		04/2009
Intranet & Calendaring Technical Design & Prototyping	02/2009		04/2009
Plans for Testing, Training, Support	04/2009		11/2009
Hardware/Software Purchased/Donated Installed	04/2009		10/2009
Collaboration Environment Launched	5/2009		12/2009
Development & Testing (including content development)	07/2009		03/2011
Deployment/Production Trial Review	9/2009		04/2011
Phase 2 Additional Functionality:			
SOW and RFQ SharePoint 2010			2/2012
Install and Configure SharePoint 2010 Virtual servers			4/2012
PRISM & Collaboration migrations to SharePoint 2010	9/2011	11/2012	

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Implement functionality enhancements (Web 2.0, personalization)	09/2011	01/2013	
Provide support for redesigning F&A unit sites on PRISM 2.0	09/2011	ongoing	
Initiate development of Electronic Forms on PRISM	06/2011	TBD	
Install and configure Project server	12/2012		
Install and configure My Sites (My Smithsonian)	01/2013		

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 (FY12):

- Fully Funded
- X Partially Funded
- Not Funded

Production Date:

2011 (Sharepoint MOSS)
1996 initial launch

Enterprise Architecture:

- X Target Architecture
- Candidate for Replacement

Units Supported:

- SI-wide

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CHAPTER 7 REVITALIZING EDUCATION

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

Snapshot: Exhibitions, Education, Outreach & the Web

LOB: Education (106); Knowledge Creation & Management (202)

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
Ask Joan of Art Interactive Learning Centers	<i>Target Architecture:</i> <ul style="list-style-type: none"> EDGE SOLAA 	n/a	n/a

Future Considerations / Performance Gaps

- By leveraging internet technologies the Smithsonian can extend its reach globally for education, exhibition, and outreach—many times as partnerships with Smithsonian content and resources hosted by our partners.
- As the distinction between informal and formal learning blurs, mobile technology will have an increasing impact as the tool of delivery for students of all ages.
- The internet is continuing to evolve into a participatory and social networking environment. 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.

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CHAPTER 7: REVITALIZING EDUCATION

7.1 Education Data Gathering & Evaluation (EDGE)

a. Description

EDGE was developed in part 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 (SCEMS) and the Smithsonian Council of Education Directors established a multi-year performance measurements project – Developing Outcomes for Smithsonian Educational Programming combining quantitative and qualitative methodologies:

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

The scope of this project did 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.

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.

Recommendations and methodologies for implementing Phase II were based on analysis of the education data collected by EDGE and meetings with staff in all units that use EDGE. The Smithsonian Education Outcomes framework was developed and implemented in July 2009. The framework combines elements from the National Science Foundation Impact Categories and the Generic Learning Outcomes framework developed by the Museum and Libraries Association in the United Kingdom. Using a series of drop-down boxes in the EDGE system, EDGE users now identify one or more learning outcomes for each program entered into the system.

Beginning in 2009, an intended learning outcomes reporting function was developed in EDGE, tested by a select group of users, and fully implemented in 2010.

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CHAPTER 7: REVITALIZING EDUCATION

SCEMS queried EDGE users in fall 2009 about desired system upgrades and developed a list of system enhancements that were added during 2010 such as, greater flexibility to record and report on multi-unit sponsored programs, added a new program type to record Online Conferences and improved data entry for adding and editing venues. Additional system enhancements were made in 2011, including new program types to record programs that are offered using web and new media technologies as well as integrated Microsoft SQL Server Reporting Services to handle ad-hoc reporting.

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 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 1 st Quarter Report ² 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		07/2009
Outcomes Reporting Functions	03/2010		08/2009
Enhanced Functionality: greater flexibility to record and report on multi-unit sponsored programs, added a new program type to record Online Conferences and improved data entry for adding and editing venues	12/2010		05/2010
Enhanced Functionality: record whether education programs have been evaluated	TBD		
Enhanced Functionality: capture educational programming that take place on social networking sites and through the use of new media technology	TBD		

² FY2007 EDGE report submitted to OP&A for SI Performance Report update to OMB.

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CHAPTER 7: REVITALIZING EDUCATION

c. Benefits

The EDGE system enables collection of accurate and consistent, quantifiable Smithsonian education data from these nine program types and from other future program types to be defined. It is the first step towards 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.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2006
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		<ul style="list-style-type: none">• AAA• ACM• APAP• FSGA• CFCH• CHNDM• HMSG• SG• NASM• NMAAHC• NMAH• NMAI• NMNH• NPG• NPM• NSRC• NZP• SA• SAAM• SAO• SCEMS• SEEC• SERC• SIL• SITES• SLC• STRI• TSA

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CHAPTER 7: REVITALIZING EDUCATION

7.2 Interactive Learning Centers (ILC): National Museum of the American Indian, *Retired*

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. It provided access to a wide variety of electronic resources. Initially, each resource center had a different configuration depending on audience needs. The National Mall ILC was a public facing application located on the third floor in the Resource Center. It once had sixteen kiosks providing a multimedia interface that served as a gateway to locally based information (about the museum, exhibits, activities, resources, collections, etc.) and approved Internet URLs. Typical users were 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 was the ability to email postcards, coloring book pages, and selected resources (bibliographies and the results from URL searches).

In 2010, the NMAI initiated a project to change the Mall Resource Center into a family activity center. In 2011 the ILC was removed from this location. Due to aging hardware and outdated software, we do not have plans to reinstate the system. NMAI also plans to remove the ILC running at the GGHC by March 30, 2012. The original need that drove this system no longer exists.

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

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Phase 9: Retirement, GGHC and Suitland	09/2011	03/2012	

c. Benefits

The ILC has been a public facing program that supports the mission of the NMAI. The system provided access to over a thousand approved websites of Native interest. The results of targeted Web searches, bibliographies, electronic postcards and coloring pages could be emailed home or to a friend. Interactive maps of the museums displayed up to date exhibit information for the visitor and NMAI produced video and audio clips were also featured. The NMAI is considering how and where this data should be made available in light of the changes to the Mall Resource Center.

d. Status @ a Glance

Funding Status (FY12):

- Fully Funded
- Partially Funded
- X Not Funded

Production Date:

- NMAI Mall: 2004
- NMAI NY: 2007
- NMAI Suitland: 2008

Enterprise Architecture:

- Target Architecture
- X Candidate for Replacement (Retiring 2012)

Units Supported:

- NMAI

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CHAPTER 7: REVITALIZING EDUCATION

7.3 Smithsonian Online 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.

SOLAA, Release 1 went into production for the public in November 2008. It provides a Web interface for the public to apply for Smithsonian academic appointments (primarily internships and fellowships) across multiple programs. 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. Eventually, SOLAA will be expanded to include all academic appointments (visiting scholars, artists in residence, short-term visitors, etc.). Release 1:

- Allows program administrators and coordinators to set up programs
- Permits applicants to select internships or fellowships/other academic appointments and then fill out and submit an application customized based on the program setup
- Permits applicants to upload files such as resumes, essays, and transcripts as part of their application
- Permits authorized staff to search applications using multiple search criteria
- Permits authorized staff to pre-register persons for designated or nominated appointments
- Permits authorized staff to set up and approve an appointment
- Permits authorized staff to enter stipend information
- Allows referees and reviewers to have limited access to the system to perform specific functions
- Provides a secure environment with appropriate backup procedures and privacy notices in place.

Currently 37 units actively use SOLAA. Some programs are open for a limited time so this number is constantly changing. Active programs are those that are open to receive applications. Since the system was implemented in November 2008, the smaller units in particular, have noticed an increase in the number of applications.

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Many changes have been made to the system since it was implemented in 2008. Restrictions were added to limit the number of staff for certain functions. Modifications were made to make the system easier to use, including with Release 2 completed as of 9/20/11:

- Registration of appointees
- Online staff requests for network access automatically generating HEAT tickets routing to appropriate staff, including the online sign-off by appointees of computer user agreement, license to SI, EEO document and copyright documents (for interns).

The Office of Fellowships and Internships began processing their applications through SOLAA in 2011 (deadline for OFI fellowships is January 15). The new online review process was implemented on 1/25/2012. Authorized staff are able to set up a review request for reviewers or committees and include instructions, due date, selected reviewer(s) or committees and optional questions. .

There are future plans to move to a new release of the development software which while providing additional functionality in design and implementation will likely necessitate some redevelopment of the application system. . During this planning period the system will be modified to:

- Rewrite the security modules of the system in response to changes in system software and technical support
- Upgrade development and database software
- Implement additional changes TBD based on priority

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
System Design Review by TRB	05/2006		09/2006
Develop application (Phase 1)	01/2007		06/2008
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
Annual Certification and Accreditation Assessment	10/2009		10/2009

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CHAPTER 7: REVITALIZING EDUCATION

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Implement PDF function	02/2010		02/2010
Registration (revised process)	12/2010		06/2011
Additional Modifications and Improved Navigation	12/2010		12/2010
Annual Certification and Accreditation Assessment	12/2010		12/2010
Redesigned Referee Process	05/2011		09/2010
On-line Review Process	09/2011		01/2012
Annual Certification and Accreditation Assessment	12/2011		12/2011
Security update	03/2012		
Upgrade to new development software	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.

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d. Status @ a Glance

Funding Status (FY12):

X Fully Funded
Partially Funded
Not Funded

Production Date:

2008

**Enterprise
Architecture:**

X Target Architecture
Candidate for Replacement

Units Supported:

• OFI (primary system owners) • SI-wide

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CHAPTER 8 ORGANIZATIONAL EXCELLENCE

Snapshot: Finance & Administration – Financial Management

LOB: Financial Management (402); Supply Chain Management (405); Administrative Management (401)

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
<ul style="list-style-type: none"> PAYES Grants Management System PACTS APS-II (2011) 	<p><i>Target Architecture:</i></p> <ul style="list-style-type: none"> ERP Financials Endowment Management System PCMS EVMS (pilot) <p><i>Candidate for Replacement:</i></p> <ul style="list-style-type: none"> FarSight FT2000 PFITS 	<ul style="list-style-type: none"> ERP Project Cost Accounting module ERP Grants and Contracts modules Cash Management Module 	<ul style="list-style-type: none"> Additional ERP Financial Modules EVMS

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.

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CHAPTER 9: INFRASTRUCTURE IT INITIATIVES

Snapshot: Finance & Administration – Human Resources Management

LOB: Human Resources Management (403)

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
<ul style="list-style-type: none"> ACES/ATS (only used for historical purposes) Multiple Volunteer Mgmt systems 	<p><i>Target Architecture:</i></p> <ul style="list-style-type: none"> ERP HRMS STARS MedGate NFC Payroll/Personnel System EPMS (Pilot) EVANS (2012) <p><i>Candidate for Replacement:</i></p> <ul style="list-style-type: none"> MEARSAccu-Trax FRCalc GLC Lookup Label Generator for AOs/Directors 	<ul style="list-style-type: none"> EAPS EPMS (SI-Wide) 	<ul style="list-style-type: none"> 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.

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CHAPTER 9: INFRASTRUCTURE IT INITIATIVES

Snapshot: Finance & Administration – Inventory Management

LOB: Supply Chain Management (405)

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
<ul style="list-style-type: none"> Surplus/Excess Property Mgmt Asset System 	<i>Target Architecture:</i> <ul style="list-style-type: none"> Warehouse Inventory Management System Smithsonian Personal Property Transaction System (SIPPTS) 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A

Snapshot: Finance & Administration – Documents & Record Management

LOB: Information & Technology Management (404)

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
<ul style="list-style-type: none"> N/A 	<i>Target Architecture:</i> <ul style="list-style-type: none"> Enterprise Engineering Document Management System NZP Synapse Legal Information System NMAI Repatriation Case Mgmt System FreezerPro 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Electronic Records Management System

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CHAPTER 9: INFRASTRUCTURE IT INITIATIVES

Snapshot: Finance & Administration – Facilities & Safety Management

LOB: Administrative Management (401)

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
<ul style="list-style-type: none"> • Hazardous Materials System • KeyWizard • AMT Direct 	<i>Target Architecture:</i> <ul style="list-style-type: none"> • FMS • NZP Chemical Applications • Fleet Management System 	<ul style="list-style-type: none"> • Parking Management System 	<ul style="list-style-type: none"> • N/A

Snapshot: Finance & Administration – Security Management

LOB: Administrative Management (401)

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
<ul style="list-style-type: none"> • Disaster Management & Contingency Planning System • MIS: OPS 	<i>Target Architecture:</i> <ul style="list-style-type: none"> • IDMS • Security Incident Reporting System 	<ul style="list-style-type: none"> • <i>Security Operations and Incident/Disaster Mgmt Planning System</i> 	<ul style="list-style-type: none"> • N/A

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CHAPTER 9: INFRASTRUCTURE IT INITIATIVES

Snapshot: Finance & Administration – Other Administration Systems

LOB: Administrative Management (401); Internal Risk Management & Mitigation (302); Controls & Oversight (301); Public Affairs (305)

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
<ul style="list-style-type: none"> • Travel Manager (2007) 	<p><i>Target Architecture:</i></p> <ul style="list-style-type: none"> • E-Gov Travel Service • IRS • VCMS • Correspondence Tracking System • FSG STRP • OIG Electronic Workpaper System <p><i>Candidate for Replacement:</i></p> <ul style="list-style-type: none"> • Risk Management Contractor Insurance Program • OIG Case Management System 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • CRM

Future Considerations / Performance Gaps

- There will be a growing need to implement contact management and donor management systems for pan-Institutional use.

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CHAPTER 9: INFRASTRUCTURE IT INITIATIVES

8.1 Financial Management

8.1.1 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 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. Under this Investment, the Institution has 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 and investing decisions.

The Institution has continued to implement additional capabilities of the financials system and respond to changing business needs. In addition to these additional capabilities the reporting capabilities and minor enhancements have been continuously implemented to support the growing needs of the program areas

Following the upgrade to version 9 in FY 2009, work began on the implementation of the project costing, grants, and contracts modules, and a replacement for the SI and SAO systems used to process and manage payroll accounting data. The new Payroll Bridge module was completed in FY 2010. The project costing, grants and contracts modules were completed in FY 2011. In addition to completing these three modules, the current ERP project plan for FY 2012 is to continue work to support new Treasury Government-wide Treasury Account Symbol Adjusted Trial Balance System (GTAS) requirements, and the implementation of the Cash Management module.

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Future plans include integrating with the new Advancement Information System to support the national campaign and automate the recording of financial information related to donations.

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		02/2011
Deploy grants & contracts modules	10/2004		04/2011
Integrate <i>Travel Manager System</i> 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		02/2009
Deploy time & labor module (front-end)	10/2004		09/2008
Deploy time & labor (backend)	06/2010		08/2010
Implement cash management module	09/2011	09/2013	
Integrate Endowment Management System	06/2012		
Implement government-wide Treasury Account Symbol reporting capability	12/2012		
Upgrade PeopleTools from version 8.4.9 to version 8.5.2	05/2013		
Integrate ERP Financials with the Advancement Information System	05/2013		

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Upgrade financials modules from version 9.0 to version 9.2	9/2014		
Implement System Award Management (SAM)	6/2014		
Re-implement Travel Interface for GovTrip replacement	9/2014		

c. Benefits

The ERP investment supports the third strategic goal of Enabling Mission through Organizational Excellence by implementing technologies to maximize flexibility and efficient use of resources and systems.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2002
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

8.1.2 Earned Value Management System (EVMS)

Line of Business	Sub-function
Control & Oversight (301)	Program Evaluation (92) Program Monitoring (93)
Financial Management (402)	Cost Accounting/ Performance Management (261)
Planning & Budgeting (304)	Budget & Performance Integration (261)

a. Description

Smithsonian Institution seeks a project management and earned value management (EVM) solution that is compliant with American National Standards Institute / Electronics Industry Alliance 748-B for Earned Value Management Systems (ANSI/EIA-748-B), National Aeronautics and Space Administration

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Procedural Requirement 7120.5D (NASA NPR 7120.5D), and Office of Management and Budget (OMB) Circular No. A-11, Exhibit 300 and Exhibit 53.

The EVM system will be used will use the EVM solution for compliant project management and reporting on multiple Federal IT, and Federal contract scientific instrumentation projects. The Smithsonian Astrophysical Observatory will also use the EVM system for costing scientific instrumentation proposals and for scheduling and resource planning for these awards within the project office and the Central Engineering cost center.

The EVM system will be fully integrated with the Smithsonian ERP, including PeopleSoft Financials, HRMS, and Kronos webTA, and will be deployed using the Smithsonian implementation of Microsoft Office Project Server (MOPS) 2007 and the Smithsonian enterprise Microsoft Office SharePoint Server (MOSS) 2007 environment.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Market Survey of EVM COTS Products			06/2010
Requirements Definition			08/2010
Request for Quote			09/2010
Product selection	12/2010		01/2011
Integration services/software contract	02/2011		02/2011
Detailed analysis and design	06/2011		06/2011
Final development, integration, testing, & deployment	03/2012	5/2012	

c. Benefits

The EVM investment supports the third strategic goal of Enabling Mission through Organizational Excellence by implementing technologies to maximize flexibility and efficient use of resources and system. In addition, as ANSI/EIA-748-B compliant project management and reporting compliant is now required for NASA projects with a life-cycle cost at or greater than \$20M, the provision of an EVM solution enables the Smithsonian Astrophysical Observatory to continue to compete for these awards..

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d. Status @ a Glance

Funding Status (FY10):	X	Fully Funded Partially Funded Not Funded
Production Date:		2012
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		<ul style="list-style-type: none">SI-wide

8.1.3 FarSight

Line of Business	Sub-function
Financial Management (402)	Funds Control (125)
Planning and Budgeting (304)	Budget Formulation (101)
	Budget Execution (105)

A server-based reporting, query, and analysis tool, *FarSight* supports day-to-day financial tracking of daily obligations and budgeting. Each of the units listed below uses versions of *FarSight*.

NMAI also uses *FarSight* for projecting S&B costs and tracking staffing changes.

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		1990s
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		<ul style="list-style-type: none">NMAIOECOPSOSOUSFAOUSHACOUSS

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8.1.4 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.

Note: The Hirshhorn Museum and Sculpture Garden only uses FT2000 to access historical information.

Funding Status (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	2000
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• SITES

8.1.5 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. It will be phased out once ERP Project Costing is fully implemented and all previously existing projects are finished.

Funding Status (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	1990s
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• OFEO

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8.1.6 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 a hosted solution used to maintain 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 (FY12): X Fully Funded
Partially Funded
Not Funded

Production Date: Oct 2010

Enterprise Architecture: X Target Architecture
Candidate for Replacement

Units Supported:

- OT
- OA
- All units with endowments

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8.1.7 Purchase Card Management System (PCMS)

Line of Business	Sub-function
Supply Chain Management (405)	Goods Acquisition (143)

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. Starting in FY2009, JP Morgan Chase was selected as the Smithsonian service provider under the GSA SmartPay® 2 program.

Funding Status (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	1990s
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• OCon

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8.2 Human Resources Management

8.2.1 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 Performance Management (255)
	HR Development (258)
	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 manual processes or multiple automated systems with limited functionality and out-of-date technology. As was the case of its financial management systems, the Smithsonian had no way to capture human resources data at the source and re-use it for multiple purposes resulting 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

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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
Implement and Enhance ERP HRMS			
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

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Deploy employee & labor relations processing	04/2005		04/2005
Deploy expanded workflow, training, health and safety, and extended benefits processes	04/2005		07/2005
Deploy succession planning, career planning, competencies, and performance management	04/2005		09/2005
Deploy the AIRS module which provided the capability to send workers' compensation CA1 forms electronically to DOL	05/2006		04/2007
Deploy Automated Employee Exit Clearance	05/2008		05/2008
Deploy 9.0 People Soft HRMS	12/2009		09/2009
Deploy Learning Path Module in HRMS	10/2010		06/2010
Develop <i>Pilot</i> Capability for employees to review and print their training records	09/2011		10/2011
Implement Single Sign-on for HRMS.	09/2012		07/2011
Merge File Room Capability into HRMS	04/2012		
Deploy Trust Self Service for Benefits	09/2012		
Decision to expand review and print of training records	09/2012		
Deploy People Soft 9.1	TBD		
Develop Interfaces			
Integrate People Soft with online recruiting STARS	07/2006		02/2007
SI Time and Attendance(webTA)	03/2008		03/2008
Bi-directional interface with EPMS (Pilot for automated/workflow for Performance Management)	06/2009		07/2009
One-directional interface to Facility Management System	10/2009		10/2009
One-directional interface to Active Directory (emplid and non-sensitive demographic data)	07/2010		03/2010
One-directional interface to Employee Assistance Program system from HRMS	09/2010		09/2010
One-directional interface between Smithsonian Enterprises System to HRMS	12/2010	12/2012	

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c. Benefits

The ERP investment supports the strategic goal “Organizational Excellence” by implementing technologies to maximize flexibility and efficient use of resources and systems which includes recruiting, hiring, and retaining a diverse workforce and promoting equal opportunity in all aspects of the Smithsonian’s employment and business relationships.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2004
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• OHR • SI-wide*

*Except Smithsonian Enterprise

8.2.2 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 Manager Enterprise* solution interfacing with USAJobs (the United States Federal Government’s official job website).

Since the e-Government initiative, the Federal recruitment process has moved to online recruiting and specifically the *Hiring Manager Enterprise* solution. Over 100 Federal, state, and local government agencies have implemented this solution and have had success. One of the reasons that *Hiring Manager Enterprise* is so widely accepted is that it is tailored for the Federal marketplace

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requiring very little customization of the software for implementation and as such the overall implementation time is reduced as well as the cost.

With *Hiring Manager Enterprise* 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 data; 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
Review solution and rebid contract	09/2010		09/2010
Migrate to Enterprise Hiring Manager	03/2011		03/2011
Interagency Agreement with National Gallery of Art	06/2011		06/2011

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. In FY10, OPM introduced a new measuring approach, measuring the time from vacancy is identified to the time a candidate steps into the position. The benchmarked for this expanded range in FY10, which was 160.88 days. The Institution is looking to use STARS to help decrease that time during FY12. 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.

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d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2006
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		<ul style="list-style-type: none">• OHR• National Gallery of Art• SI-wide

8.2.3 Employee Assistance Program System (EAPS)

Line of Business	Sub-function
Human Resources Management (403)	Employee Relations (256)

a. Description

The Institution's Office of Human Resources (OHR) provides employee assistance programs (EAP) for the following areas:

- Personal, emotional
- Family and marital
- Reasonable accommodations
- Workplace relationships
- Stress and change issues
- Substance and alcohol problems

These EAP Services are confidential and available free of charge to all Smithsonian Employees. In addition to providing Counseling Services, EAP staff also provides Management Consultation, Training Services, Work Life Programs referral and lunchtime seminars.

In FY2009, the Office of Human Resources performed a market analysis and selected a browser-based solution by Medcomp entitled Caseware Premier for case management recording and reporting.

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b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Acquire Caseware Premier	12/2009		12/2009
Install test environment	01/2010		01/2010
Deploy the 5 user system to EAP group.	06/2010		06/2010
Deploy one directional interface to Employee Assistance Program system from HRMS	09/2010		09/2010

c. Benefits

This investment supports the strategic goal of Organizational Excellence by implementing technologies to maximize flexibility and efficient use of resources and systems.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2010
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• OHR

8.2.4 Occupational Health and Safety System (MedGate)

Line of Business	Sub-function
Human Resources Management (403)	Employee Relations (256)

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

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tracking, environmental monitoring, along with standard letters and OSHA reports.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Deploy Medgate 7+	12/2011		01/2012

c. Benefits

The Medgate initiative supports the Smithsonian strategic goal of organization excellence as part of an ongoing effort to modernize the Institution's information technology (IT) systems, and providing support and monitoring when an employee is injured and unable to return to work.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2005
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	OFEO

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8.2.5 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 employees enter their timecards. Beginning in FY 2005, the NFC Front End Systems Interface (FESI) is used to automatically transmit actions completed in the ERP HR system or WebTA to the NFC Payroll/Personnel system. The interface is also used to update the ERP HRMS database with auto actions generated by NFC systems. In FY2011, modifications were made to the Payroll files to include the treasury symbol and appropriation code for ABCO records and descriptors for the timecard data.

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
Upgrade to new FESI interface for OPM requested database changes at NFC	10/2008		11/2008
Add fields to bi-weekly Payroll files	10/2011		10/2011

c. Benefits

NFC is one of the recommended federal payroll providers.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2005
Enterprise Architecture:	X	Target Architecture Candidate for Replacement

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Units Supported: • OHR • OC

8.2.6 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). The use of eOPF will require a scanner/software setup prior to going live.

In FY 2011, Smithsonian started the assessment phase of the project. Upon conclusion of the assessment phase the Smithsonian will determine what the next steps are in light of the project not being funded. Starting initially with the assessment was signed off between OPM and the Smithsonian.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Sign Agreement with OPM	02/2009		09/2011
Assessment:			
Complete Assessment	06/2012	06/2012	
Set goals based on Assessment and Funding	08/2012	08/2012	
Establish eOPF Steering Committed	TBD	TBD	
Future Phases:			
Go Live with eOPF (without back files)	09/2009	TBD	
Load back files for eOPF	09/2011	TBD	

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c. Benefits

The eOPF initiative supports the Smithsonian strategic goal of Enabling Mission through Organizational Excellence by implementing technologies to maximize flexibility and efficient use of resources and systems.

In addition, the Smithsonian's use of it will allow both federal and trust employees 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 (FY12):	Fully Funded Partially Funded X Not Funded
Production Date:	TBD (planned)
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• OHR SI-wide

8.2.7 Electronic Performance Management System (EPMS)

Line of Business	Sub-function
Human Resources Management (403)	Employee Development & Performance Management (255)

a. Description

The Electronic Performance Management System (EPMS) uses *Halogen eAppraisal* software to automate the Smithsonian's performance management process. EPMS is used by employees and managers to define performance plans, track mid-year progress, and conduct end-of-year evaluation and rating. The system provides automated email reminders to inform participants in the process (i.e., employees, managers, and reviewers) when they have upcoming tasks or are late in completing necessary activities.

EPMS is initially implemented as a pilot project (a.k.a Phase I). The scope of the Phase 1 pilot was to identify system performance issues and business issues involving approximately 2,000 users. Phase I also included implementing e-Appraisal software with the following configuration:

- Appraisal form configuration.

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- Work flow changes to reflect how appraisals are done at the Smithsonian Institution
- Bi-directional interface between ERP HRMS

Phase 2 of the project involves rolling out the product for the remaining 4,000 users and training them on its use. Phase 2 is dependent on funding the additional licenses*.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Phase 1, Pilot			
Complete Phase 1, Pilot	11/2010		09/2010
Post Production Review	12/2010		12/2010
Phase 2, SI-Wide Deployment			
Migrate to Halogen Release 10	06/2011		06/2011
Begin Institutional wide deployment	11/2011*	06/2012	
Complete Institutional wide deployment	09/2013*	09/2014*	

c. Benefits

The EPMS is being deployed to replace the Smithsonian's current Performance Management System which consists of Word and Excel templates. By automating the current paper-based appraisal process, not only will the appraisal process be streamlined, but:

- Employee, manager, and reviewer information will be controlled by PeopleSoft HRMS
- Users can avoid legally questionable language and spelling mistakes.
- Performance review information will be centrally stored keeping the history of each employee in a central database instead of in the filing cabinets of different managers.
- Provide managers with the same look-and-feel of the current paper process to reduce the learning curve.
- Allow HR, managers, and employees to access their appraisals and track their progress at any time.
- Allow HR to centrally track the entire process from the HR Control Center.
- Provide automated email notifications of upcoming required activities.
- Provide current "snap shot" reports for management of the current status of appraisal activities.

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d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2009 (pilot) 2012 (begin SI-wide deployment)
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	OHR • SI-wide

8.2.8 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. 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.

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c. Status @ a Glance

Funding Status (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	2004
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• OFEO

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8.2.9 Volunteer Management System (EVANS)

Line of Business	Sub-function
Human Resources Management (403)	Compensation Management (253) Human Resources Development (258)

a. Description

The Smithsonian as a whole has over 6,500 unpaid volunteers working in over 25 separately managed volunteer programs. Each volunteer program is currently using multiple and outdated database systems as well as pen and paper to capture and manage volunteer data. The Behind-the-Scenes Volunteer Program (BVP) is the largest volunteer program at the Smithsonian. There are nearly 1600 active behind-the-scenes volunteers and over 700 active behind-the-scenes volunteer jobs. BVP works with over 600 Smithsonian staff members who serve as supervisors and timekeepers for behind-the-scenes volunteers in various Smithsonian duty stations in DC, MD, NY, MA, AZ, CA and special field projects all over the world. In addition, there are “virtual volunteers” many of whom are not currently counted and managed in any volunteer management system – but will be able to be included in EVANS.

In FY2011 the Samaritan Product was selected as the software to be used pan institutionally for managing and recording volunteer hours. This web-based software will begin to roll out to the volunteer program starting in March of 2012, and is referred to as EVANS (Every Volunteer Accounted for in Samaritan).

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Product Selection	08/2011		08/2011
Contract Signed	09/2011		09/2011
Begin Phase Deployment of EVANS	03/2012		
Complete Phase Deployment of Evans	12/2012		

c. Benefits

The benefits of a pan-institutional system is to provide a single source for managing and tracking Smithsonian volunteers and to eliminate the outdated database systems as well as pen and paper. To allow the volunteer to be able to record their time via sign in stations, or from home and provide the volunteer the capability to retrieve their own report on volunteer hours. Finally to provides a

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robust system that will protect PII (Personally Identifiable Information) of the volunteer.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2012
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		<ul style="list-style-type: none">Office of Visitor ServicesSI-wide

8.2.10 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 lektreiver 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. This system will be retired once eOPF is implemented.
- **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>

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- **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. (System only used for historical reporting -- applicant tracking now done in STARS.)

8.3 Inventory Management

8.3.1 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*, on the OCon/PPM Warehouse Operations Website (OWOW) to support warehouse supply inventory management to track supplies, receive supply requests, issue stocked supplies, and to issue receipts to Smithsonian units.

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:	2009	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	• OCon&PPM	• SI-wide

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8.3.2 Smithsonian Personal Property Transaction System (SIPPTS)

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 for personal property management transactions including controlling and managing the disposal of surplus/excess personal property assets.

System functionality includes: (1) the capability of all Smithsonian units to view available excess personal property for reuse; (2) a potential automated retirement of disposed assets from the SIPPTS to the ERP Asset Management Module; (3) improved reporting; (4) completely automated SI 707, Property Transaction Form for SI users; and (5) 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 Smithsonian staff.

c. Status @ a Glance

Funding Status (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	2010
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• OCon • SI-wide

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8.4 Facilities & Safety Management

The Smithsonian Institution manages over 700 owned facilities comprising 12 million square feet, more than 1,000,000 square feet of leased space, and 19,000 acres of land, including 19 museums and galleries in Washington DC, and New York City. The institution also manages: a zoological park; an animal conservation research center in Virginia; horticultural, collection storage, and restoration facilities in Suitland, MD; centers for biological research; conservation and education programs in Panama and on the Chesapeake Bay; a center for astrophysics in Cambridge, MA; the Whipple Observatory on Mt. Hopkins in Arizona; a new telescope on Mona Kea in Hawaii; and the Smithsonian Marine Station in Fort Pierce, Florida.

The Smithsonian is undergoing one of the most ambitious and aggressive capital investment programs of its history. Work is underway on the newest addition, the \$500M National Museum of African American History and Culture. The major repair, restoration and alteration projects to modernize Smithsonian facilities worldwide and the ongoing maintenance programs are expected to result in a total facilities investment in excess of \$2 billion.

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.

The Smithsonian must ensure that more than 137 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.

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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.

8.4.1 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 total facilities investment in excess of \$2 billion the Smithsonian has implemented a commercial facilities management software product— *Tririga (FacilityCenter)*. *Tririga* 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 real estate management, facility projects, work order management for facilities operations including security and safety, planned maintenance, hazardous materials and conditions, employee self service, and facility condition assessment.

In FY 2011, the Institution:

- Continued to provide support for the Hazardous Materials Inventory Tracking module; performed market analysis research to find a complimentary software tool to integrate with the Hazardous Chemical module to facilitate the development of a Smithsonian inventory for the Material Safety Data Sheets (MSDS). An acquisition of the software tool, MSDS Online was made and work has begun to define and load the data sheets.
- Provided Hazardous Chemical refresher training to NMAH and NMNH facilitate the entry of their hazardous chemical inventories into the system.
- Developed and implemented METR Inspection and Hazardous Chemical online training program to provide users with the ability to take training on their own schedule and at their own pace.
- Completed the analysis and research to evaluate mobile solutions; results will led to a recommendation to implement Syclo as the Enterprise Mobile Strategy. Development of the application is in progress.

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- Implemented enhancements to Medgate as a major tool to manage and track OWCP cases administered by OSHEM and OHR; strengthened case management capabilities to better manage occupational health programs (e.g., respiratory protection, hearing conservation, zoonoses, travel, flu shots and immunizations..
- Key & Lock Management - completed the design, development, and data migration for the Phase I implementation of the Key & Lock module in Facility Center. The new module was implemented in May 2011. KeyWizard, the legacy system, was retired.
- Researched ESRI GIS technology and prepared a business case and cost estimate for the re-development of SI Explorer.
- Continued to work with OFEO to update facility assets information; and to develop job plans and maintenance schedules.
- Implemented Phase I of the Facility Center Real Estate Leasing project in September 2011 to consolidate lease information with the facility information currently maintained in Facility Center. The implementation facilitates shared information eliminating duplicate data entry efforts and inconsistent data. The previously hosted system, AMT Direct, is no longer being used.
- Continued to update and maintain space information and associated floor plans using CAD integration.
- Provide support for the submission of the Federal Real Property submission to GSA.
- Real Property - enhanced Facility Center to add new functionality to comply with new GSA guidelines and to facilitate the submission of the annual Federal Real Property report.
- Continued work to incorporate the OPS reimbursements in FacilityCenter.
- Hazardous Materials Tracking - continued to provide support for the Hazardous Materials Inventory Tracking module; performed market analysis research to find a complimentary software tool to integrate with the Hazardous Chemical module to facilitate the development of a Smithsonian inventory for the Material Safety Data Sheets (MSDS). An acquisition of the software tool, MSDS Online was made and work has begun to define and load the data sheets.
- Mail Management System – continued work on the design and implementation of the Mail Management System. Work included teaming with Mail Services to develop a High Level Architecture and Design,

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exploring alternative system configuration and resources, and ensuring security requirements are met,

- Mobile Work Management - formalized requirements for the implementation of the Facility Center mobile device technology and selected the SYCLO software product. Completed the software licensing acquisition and services engagement and began work on the design and development in preparation for a Spring 2012 implementation. In support of this project, OCIO led the effort to implement a Smithsonian Enterprise Mobile Device Management tool. Efforts included leading an OCIO team effort to define the requirements and the roles and responsibilities, perform research analysis and selection, and perform product testing and evaluation.
- Parking Management System – continued work to implement a modernized parking management system. Efforts included analysis, design, and development. Phase I for the back office functionality is scheduled for February 2012. The self service functionality is scheduled for deployment in April 2012.
- Safety Application Training - developed and implemented METR Inspection and Hazardous Chemical online training program to provide users with the ability to take training on their own schedule and at their pace.
- SI Explorer - completed work on the SI Explorer upgrade to incorporate themes for hazardous conditions (including ACM).
- SI Explorer 2 - prepared a Request for Proposal (RFP) for the acquisition of services to develop an upgrade of the Smithsonian's SI Explorer software. After a formal panel review was performed, a recommendation was submitted to the Purchasing Officer. The acquisition is pending however the project is tentatively expected to begin in early 2012.
- SIRS - Security Incident Reporting System Upgrade – included upgrading the database to SQL 2008, upgrading the software to the most current release, and installing the application on a new (virtual) server.
- SIRS2 – Security Incident Response System – continued work with OPS to design screens for incident response and roster management. Prepared system for NASM pilot.
- VCMS - Visit Count Management System – reported problems with the Multi Year Reports resulted in extensive work to determine the source of the problem, and to design and implement a solution. All historical reports were updated to accurately reflect visit counts.

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- Visitor Management System – began work to explore the requirements and performed a high level cost analysis to determine the feasibility, and cost of implementing new functionality

IT Technology Initiatives :

- Conference Presentation - The Smithsonian gave a presentation on the implementation of the Key & Lock module at the annual Tririga International Users Conference in Las Vegas.
- Crystal Reporting – upgraded the servers and the Crystal software.
- Disaster Recovery/FISMA - successfully completed the Disaster Recovery Testing at the SunGard facility in Philadelphia, PA; and the OCIO FISMA security reaccreditation and table top review of the FMS Disaster Recovery Plan.
- IBM-Tririga - implemented an evaluation copy of the upgraded Facility Center (IBM - Tririga 10) software to determine the level of effort to upgrade the application and the platform. Began work to upgrade the application platform in early 2012. Efforts included analysis and design, as well an upgrade of the application servers. Work in support of the application upgrade will begin in the Spring 2012.

Operations

- Assets/PM - continued to work with OFEO to update facility assets information; and to develop job plans and maintenance schedules.
- Facility Assessment - Configured the Facility Assessment functionality in a test environment and also configured the Facility Center Opportunities functionality in Facility Center as a “Proof of Concept”.
- Hazardous Chemicals – provided Hazardous Chemical refresher training to NMAH and NMNH facilitate the entry of their hazardous chemical inventories into the system.
- Space Management/CAD - continued to provide support for the maintenance of the space information and associated floor plans using CAD integration.
- METR Inspections - continued to provide technical support for the METR Inspection Tracking System.
- Reporting - continued to developed new reports for Real Property and Operations/Maintenance using the Crystal Enterprise Server application.

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- Work Management Reimbursements - continued work to incorporate the OPS reimbursements in Facility Center.

In the period FY 2012 - 2016, the Smithsonian will continue to consolidate redundant systems, provide training to users, perform software configuration, upgrade the software and hardware platforms, and enhance system reliability and availability.

The Smithsonian plans to continue to expand the use of *Tririga* to assist OFEO in managing its operations including space, projects, asset, and work order management. This includes continuing work with OFEO to: 1) implement capital planning and project management functionality with integration between FacilityCenter and the ERP, and with the ability for Smithsonian staff to view facility specific data from PRISM; 2) expand the implementation of Hazardous Materials tracking to other facilities and incorporate MSDS Library; 3) provide archival abilities for METR Inspections and continue to expand its use for analysis, tracking, graphic display and sharing of information; 4) expand solutions for the analysis, tracking, display and sharing of hazardous conditions information (i.e., asbestos, lead, confined space) located in Smithsonian facilities; 5) continue work with OFEO on assets and incorporate job plans and schedules including additional safety procedures, processes and data (e.g. Confined Space); 6) implement work management enhancements specifically implementing Smithsonian-wide Self-service Facilities and a Special Event process to replace the SI Form 23 process and to facilitate the real time processing of service requests; 7) expand the capabilities of Medgate to enhance the SI's management of its occupational health programs; 8) implement facility condition assessments functionality; 9) continue work on the implementation of mobile handheld technology; 10) complete the consolidation of OFEO reimbursements; 11) continue the implementation of Asset / PM functionality at STRI; 12) continue with the implementation of the key and lock functionality; 13) upgrade GIS software and implement appropriate security controls for sensitive data; 14) deploy an enterprise data warehouse and a reporting tool; 15) interface with the Smithsonian Centralized "People" repository for people related information; 16) begin work to integrate BIM technology; 17) assist OFEO through the process of obtaining a Security Accreditation for the Building Automation System; and integrate FacilityCenter with the Building Automation Systems and Asset Reliability Systems for asset reliability data and work task generation; 18) integrate FMS with the Energy CAP utility system data; and 19) implement a visitor management system.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Initial Implementation			9/2007
Facility Asset Management:			

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Deploy Asset Management	06/2008		12/2008
Continue to implement Asset Management in each OFEO Zone (including STRI)	12/2009		06/2011
Implement Asset Management/PMs for Security Alarm Systems	12/2011	12/2012	
GIS:			
Mall floor plans, geospatial integration with FMS	06/2002		06/2008
Geospatial integration with FC Hazardous Materials	03/2010		09/2010
Upgrade GIS System Software - ESRI; includes existing functionality	09/2008		08/2011
Geospatial integration with FC Assets - ESRI	12/2009		10/2011
Geospatial integration with FC Projects	03/2012		
Geospatial integration with FC Work Management	12/2011		12/2011
Geospatial integration with FC People	09/2010	06/2012	
Integration:			
ERP/FC integration: HR	10/2007		12/2009
ERP/FC integration: Time & Labor	10/2007		11/2008
ERP/FC integration: Projects	12/2011		
Integrate Building Automation System (BAS) & FC	12/2004	09/2015	
Disaster Management System integration with Facility Center	10/2007	12/2013	
FC / Fleet Integration	12/2010	01/2016	
Integrate BIM technology with FC	09/2010	03/2013	
Interface with "People" data repository	10/2009	12/2013	
Energy System (CAPS) Integration	10/2007	12/2014	
ERP/FC integration: Assets	10/2008	09/2015	
FC MedGate integration	10/2008	09/2015	
Implement Smart Chip technology	03/2010	03/2016	
Data integration with 3-D design, analytical, & simulation technology tools	06/2010	06/2016	
Projects:			

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
FC – Implement and Integrate Maintenance / Repair Planning, Capital Project Planning, and Project Management, with linkages on project information between FC and ERP	08/2012		
Portfolio:			
Implement Condition Assessment functionality for pilot – Phase 1	01/2010		01/2010
Implement Condition Assessment functionality for pilot – Phase 2	12/2011		12/2011
Implement Lease Functionality	TBD		
Implement Reserve Management	09/2011	09/2014	
Reporting Solution:			
Deploy an interim enterprise reporting solution (Phase 1)	03/2008		06/2008
Implement data warehousing	10/2007		10/2011
Deploy alternative interim enterprise reporting solutions (Phase 2)	01/2010		01/2012
Safety:			
Hazardous Materials - Pilot	09/2008		12/2009
Hazardous Materials – Phase I (NMNH and NMAH)	12/2010		08/2010
Hazardous Materials – Phase 2 (Continue deployment)	02/2012		
Implement METR Inspection functionality – Phase I (Initial deployment to museums)	6/2009		06/2009
Implement METR Inspection functionality – Phase 2 (complete deployment– includes automatic generation of work requests from deficiencies)	12/2010		06/2011
ACM: Implement functionality to track and manage asbestos	09/2010		08/2010
Hazardous Conditions – Phase I: Implement functionality for increased visibility and safety controls	09/2010		08/2010
Hazardous Conditions – Phase II: Implement additional enhancements	04/2011		04/2011

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Software / Hardware:			
Upgrade to <i>Tririga 8i</i>	06/2004		03/2005
Upgrade to <i>Tririga 9i</i>	01/2009		01/2009
Upgrade Application Server	06/2011		06/2011
Upgrade Process Server	06/2011		06/2011
Building Automation Security Accreditation	09/2011		09/2011
Oracle Database Upgrade	09/2011		09/2011
Upgrade Storage Device	09/2011		09/2011
Upgrade Oracle Database Server	09/2011		09/2011
Tririga Platform Upgrade	12/2011		12/2011
Tririga Application Upgrade	12/2011		12/2011
Work Management:			
Consolidate redundant systems: OPS MIS Reimbursement migration to FMS	10/2006	04/2012	
Implement Key & Lock module	06/2010		09/2011
Deploy Tririga mobile device technology	12/2002	09/2012	
Expand Self-Service Request Module	03/2010	12/2012	
Implement Customer Surveys	09/2011		09/2011
Inspections (Watch Tours, Safety, Security)	TBD		
Implement Visitor Log functionality	TBD		
Implement Call Center functionality	TBD		
Implement Move Management module	04/2010	12/2013	

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.

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- 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; provide safety coordinators with access to the most recent Material Safety Data Sheets (MSDS) for hazardous chemicals/products in their facilities.
- 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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		1998
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• OFEO

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8.4.2 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 included an interface for fuel management, and Phase III will include an interface for Fleet Pool Reservation System.

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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 - <i>Fleetwave</i>	09/2007		09/2007
System design	01/2008		01/2008
Training	02/2008		02/2008
Operational (assets, maintenance schedules)	03/2008		03/2008
Phase II, Fuel Management	04/2009		03/2009
Phase III, Fleet Pool Reservation System	03/2010	12/2012	
Expand use of Fleetwave to STRI	12/2011		12/2011
Phase IV, GPS Interface	08/2010	12/2012	
Phase V, Implement Mobile Technology	12/2012		
Interface with Facility Center	12/2010	12/2012	

c. Benefits

A system providing a comprehensive inventory of all fleet and equipment assets assists 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 (FY12):	<input type="checkbox"/> Fully Funded <input checked="" type="checkbox"/> Partially Funded <input type="checkbox"/> Not Funded
Production Date:	2008
Enterprise Architecture:	<input checked="" type="checkbox"/> Target Architecture <input type="checkbox"/> Candidate for Replacement
Units Supported:	<ul style="list-style-type: none"> • OFEO • SI-wide

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8.4.3 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 implemented in 1994 using now 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
Initial Requirements Review & Marketing analysis			2005
Initial Business Use Case development & Marketing Analysis	09/2009		09/2009
Update Business Requirements & Marketing Analysis	12/2010		12/2010
Product acquisition	03/2011		09/2011

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Implementation	09/2011	09/2012	

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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2012
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• OFEO-OPS • SI-wide

8.4.4 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

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professionals including curators, veterinarians, pathologists, environmental safety engineers and the Smithsonian Industrial Hygienist before being released. Approximately 3200 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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2003
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	NZP

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8.5 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.

8.5.1 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.

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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 Lifecycle 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
New IDMS in Production	06/2006		11/2009
Implement new IDMS and document & fingerprint scanning systems at all remote locations	06/2006		11/2010
Interface with Peoplesoft HR systems	10/2006	TBD	

c. Benefits

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The IDMS initiative supports HSPD-12, and 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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2010
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• OPS

8.5.2 Security Operations and Incident / 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 Security Operations and Incident/Disaster Management System to manage daily operational requirements such as scheduling staffing and resources, guard tours, inspections, and report reviews. The system will also be used to log, track and provide guidance on routine emergencies and incidents in SI facilities that OPS secure. The system will have the ability to develop procedures and checklists to ensure consistent application of policy per SI building. The system will also have the ability, in a second phase of development, to manage disaster level incidents that may occur at Smithsonian facilities.

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The Disaster Management Planning aspect of the system will be used 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
DPMS Requirements & Market Analysis	06/2009		12/2009
Software review and selection	01/2010		01/2010
Deploy Disaster Management Planning System (DMPS) – Phase 1	03/2009	09/2012	
Integrate the DMPS with FMS for shared floor plans, hazardous materials, and staff location information.	09/2009	TBD	

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c. Benefits

Improving daily operations and incident management will allow OPS to more effectively and efficiently manage reduced security staffing and provide a tool for management to ensure security activities are being performed in compliance with OPS policy and procedures.

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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2011
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• OFEO-OPS • SI-wide

8.5.3 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

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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 hardware	09/2007		09/2007
Implement application and perform training	06/2007		04/2008
Upgrade Perspective software	04/2011	06/2012	

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.

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d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2008
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	OFEO-OPS

8.6 Document and Records Management

8.6.1 Enterprise Engineering Document Management System

Line of Business	Sub-function
Information & Technology Management (404)	Record Retention (141) Information Management (142)

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. Since 2005, OEDC has systematically digitized all paper and microfilm related to design and construction project records. These digital files are now stored in the Engineering Document Management System (EDMS) database, Columbia Soft's *Document Locator*.

OEDC has incrementally modified its business processes to drastically reduce the amount of project related paper documents generated, increasing the use and value of the EDMS to support project filing needs. Additionally, OEDC has expanded the use of the system to support other OFEO offices, including the Office of Safety, Health and Environmental Management, the Office of Protection Services, and the Office of Planning and Project Management, archiving critical facilities related records and drastically reducing paper file storage requirements. This program is currently in maintenance mode, with no further plans for expansion at this time.

OFEO is continuously improving the existing repositories through improvements to the data properties and database design, and also continue to move more data into the repositories as design and construction projects reach completion. We recently purchased a new server to accommodate the growing demand for data storage. It was installed in the Herndon Data Center in January 2011.

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Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2006
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	OFE0

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8.6.2 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. OCIO supports OGC's SQL database and file server as of February 2010.

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 (FY12):	Fully Funded
	Partially Funded
	X Not Funded
Production Date:	1990s
Enterprise Architecture:	X Target Architecture
	Candidate for Replacement
Units Supported:	• OGC

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8.6.3 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 6,000 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 (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	2003
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• NZP

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8.6.4 FreezerPro

Line of Business	Sub-function
Information & Technology Management (404)	Record Retention (141)

a. Description

FreezerPro (Ruro software, <http://www.ruro.com>) is as an off-the-shelf software solution used to track the location and condition of biological samples stored in freezers, with the option to also use RFID. It provides a centralized system for tracking frozen plant and animal tissue samples that are kept in freezer storage to preserve them for future analysis, particularly DNA analysis.

The Smithsonian Institution has many biological tissue samples from plants and animals collected from around the world. These samples are stored in a variety of freezers in order to preserve them for future analysis, particularly DNA analysis. These biological tissues and DNA samples are an important part of the museum's collection, contain many rare species, and are rapidly increasing in number as taxonomic research delves deeper into the genetic and genomic realm.

NMNH is initially implementing FreezerPro. The next phases of FreezerPro at SI will be the use of FreezerPro at other SI Units (NZIP and STRI). These Units are still defining their freezer storage data needs and are working on their registration and transaction management software. Also, in future phases of FreezerPro implementation, communication with existing databases such as EMu (NMNH's specimen and transaction management systems) will be implemented.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Phase 1:			
Requirements review	06/2010		06/2010
Production, NMNH	12/2010	04/2012	
Post Implementation Review	2/2011	06/2012	
Additional Deployments:			
Roll out at STRI	TBD		
Roll out at NZP	TBD		
Roll out at SERC	TBD		

c. Benefits

These tissue samples are an important part of the museum's collection containing many rare species. Knowing exactly where tissues are located in a freezer allows the samples to be removed quickly and therefore reducing the thaw/freeze exposure that shortens a sample's usable life when a freezer is opened.

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The Institution's infrastructure for tissue sample storage is rapidly growing and now includes the NMNH Pod 3 Biorepository, a new freezer storage facility located at the Museum Support Center in Suitland, Maryland, which was completed in 2010. In addition to the Pod 3 Biorepository at NMNH, freezer collections are maintained by other SI Units including the National Zoological Park (NZIP), the Smithsonian Tropical Research Institute (STRI) and the Smithsonian Environmental Research Center (SERC). Before the Pod 3 Biorepository was constructed, there was no centralized technology solution for tracking frozen samples across units or departments

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2012
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	NMNH

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8.6.5 NMAI Repatriation Case Management System

Line of Business	Sub-function
Controls & Oversight (301)	Corrective Action (091)

a. Description

NMAI's Repatriation Department is implementing a case management system called "Client Profiles." The system has the capability— through a central repository—to organize; track; manage; and report on inquiries, claims, and support the staff to proactively research cases.

The system was implemented in early FY11. Other than adding past records and addition new case files, we have not made any change to the functionality of the system. We anticipate the version (as provided by the Vendor) will be updated some time in FY12.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
System Acquisition	08/2010		8/2010
Set-up server, install software	10/2010		10/2010
Set up Exchange Integration	12/2010		12/2010
Vendor configure screens	12/2010		12/2010
System Testing	01/2011		1/2011
User Training	01/2011		1/2011
Go Live	01/2011		1/2011

c. Benefits

- Standardized business processes and increased operational efficiency to reduce cost per case and time per case achieved by improved case management (tracking, status), and shared access
- Improved assurance and data integrity
- Improved reporting capabilities with more effective and manageable access to accurate information
- Improved workflow

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d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2011
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• NMAI

8.6.6 Electronic Records Management System (ERMS)

Line of Business	Sub-function
Information and Technology Management (404)	Record Retention (141)

a. Description

A Smithsonian-wide Electronics Records Management System (ERMS) will enable the Institution as a whole 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.

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)), federal OMB budget submission requirements, and more recent changes to the Federal Rules of Civil Procedure, and other regulatory obligations. It will simultaneously enable acquisition and retention of historically valuable electronic records that are currently lost due to the lack of an enterprise-wide ERMS system.

b. Benefits

Use of an ERMS by Smithsonian staff will improve Institution compliance with legal and regulatory requirements for electronic records management and retention. It will simultaneously enable acquisition and retention of historically valuable electronic records that are currently lost due to the lack of an enterprise-wide ERMS system.

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It will increase efficiencies and other benefits such as reduced costs by:

1. Consolidating the growing number of unit or office-specific ERMS's into a single shared system, thereby lowering the aggregate costs incurred through the current redundant systems.
2. Providing electronic record management services to all units.
3. Maintaining its official electronic records in a secure, controlled manner according to established record retention policies, thereby improving its governance practices and compliance with regulatory and historical record keeping obligations.
4. Enforcing proper retention and management of electronic records for the full duration of the record lifecycle.
5. Facilitating the identification, retrieval, and proper handling of records from disparate and distributed systems by authorized employees, such as Smithsonian legal staff responding to litigation issues,
6. Storing a "single-instance" of electronic records, thereby eliminating the excessive storage consumption created by the existing duplication of records in and between offices,
7. Allowing the Smithsonian to respond faster to e-discovery inquiries while significantly reducing retrieval costs as a direct result of the more precise record classification.

c. Status @ a Glance

Funding Status (FY12):		Fully Funded
		Partially Funded
	X	Not Funded
Production Date:		TBD
Enterprise Architecture:	X	Target Architecture
		Candidate for Replacement
Units Supported:	•	SI-wide

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8.7 Other Administration Systems

8.7.1 Correspondence Tracking System

Line of Business	Sub-function
Public Affairs (305)	Public Relations (111)

The Office of the Secretary 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 Human Resources employs the notification functionality to alert other offices about correspondence for which they are responsible.

Funding Status (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	1997
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• OS • OHR

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8.7.2 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.

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c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2007
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

8.7.3 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.

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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
Modernization – requirements, design, development, implementation	07/2004		07/2004
Database upgrade	04/2008		04/2008
Server / database upgrade	09/2011	09/2011	
Software and reporting enhancements	06/2009	TBD	

d. Status @ a Glance

Funding Status (FY12):

X Fully Funded
Partially Funded
Not Funded

Production Date:

2004

Enterprise Architecture:

X Target Architecture
Candidate for Replacement

Units Supported:

• OFEO • OPS

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8.7.4 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 (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	1995
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• OT

8.7.5 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 (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	1999
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• OT • SI-wide (data entry)

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8.7.6 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 (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	2003
Enterprise Architecture:	Target Architecture X Candidate for Replacement
Units Supported:	• OIG

8.7.7 OIG Electronic Workpaper System (OIG EWS)

Line of Business	Sub-function
Controls & Oversight (301)	Program Evaluation (092)

a. Description

The Office of the Inspector General (OIG) Electronic Workpaper System (EWS), based on the TeamMate electronic work paper system, is a system internal to the office. EWS are used in accounting and audit organizations to provide document management and workflow; and also allows for greater controls over sensitive audit information.

b. Benefits

EWS introduced a number of improvements to the OIG's audit process. The system allows for electronic storage of most documents related to an OIG audit, eliminating thousands of pages of hard copy documentation per audit and permitting multiple team members simultaneous access to the audit work papers and supporting evidence. The system also allows supervisory auditors to review work in progress and alerts supervisors of completed work that is ready for final

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review. The electronic format provides auditors with greater ability to work off-site, such as at auditee locations or via telecommuting using encrypted replicas.

c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2010
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• OIG

8.7.8 FSG Strategic Planning System (STRP)

Line of Business	Sub-function
Planning & Budgeting (304)	Strategic Planning (104)

a. Description

The Freer|Sackler implemented the strategic planning and project management application ManagePro, by Performance Solutions Technologies, in 2010. Its purpose is to facilitate the linking of departmental and collaborative initiatives to the overall F|S Strategic Plan. ManagePro scores strategic elements of the plan by averaging the scores of related sub-goals and their linked activities. Each Freer|Sackler Department Head contributes "progress updates" three times a year to provide the data. An overall report is produced at the end of each of these periods which is shared with the Director's Senior Leadership Group and Director's Advisory Group

b. Benefits

ManagePro provides for a single application to store, review, and collate departmental and collaborative initiatives and tie their performance directly to the Strategic Plan. It also greatly improved the collection and reporting process of Departmental Plans of benefit to both the Director and department heads.

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c. Status @ a Glance

Funding Status (FY10):	X	Fully Funded Partially Funded Not Funded
Production Date:		2010
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	FSG

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CHAPTER 9 INFORMATION TECHNOLOGY INFRASTRUCTURE

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)

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Snapshot: IT Infrastructure

LOB: Information & Technology Management (404)

Retired	Production (2012)	Planned (2013 to 2016)	
		Funded	Unfunded
<ul style="list-style-type: none"> • EMC Clariion & Centera Storage; • EMC VTL and ADIC i2000 Backup Systems • Novell ADS & GroupWise • Various search engines • 98 obsolete phone systems 	<p><i>Target Architecture:</i></p> <ul style="list-style-type: none"> • Virtualization of Servers • Microsoft Active Directory & Exchange • Enterprise Mail System and Mobile Email Services • CITRIX • Isilon and VNX Storage • Quantum DXi Backups • Mobile Device Management • Secure Wireless • Telepresence • Desktop Video Conferencing • VoIP Telephony • HEAT <p><i>Candidate for Replacement:</i></p> <ul style="list-style-type: none"> • VPN 	<ul style="list-style-type: none"> • Enterprise Storage & Backup Expansion 	<ul style="list-style-type: none"> • Mirrored Data Center

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 shift in providing email services, office applications, and collaboration tools through a dedicated government cloud, a private cloud, or a blend of on-premise and cloud offerings,
- Expanding our secure wireless network to meet the demands of providing Public WiFi to our museum visitors.
- 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 increasing collaborations external to the organization and with Smithsonian units geographically dispersed, there will be increasing demands for virtual communications tools.

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9.1 Network Management

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.

9.1.1 Network Operations, SInet

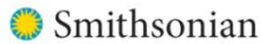
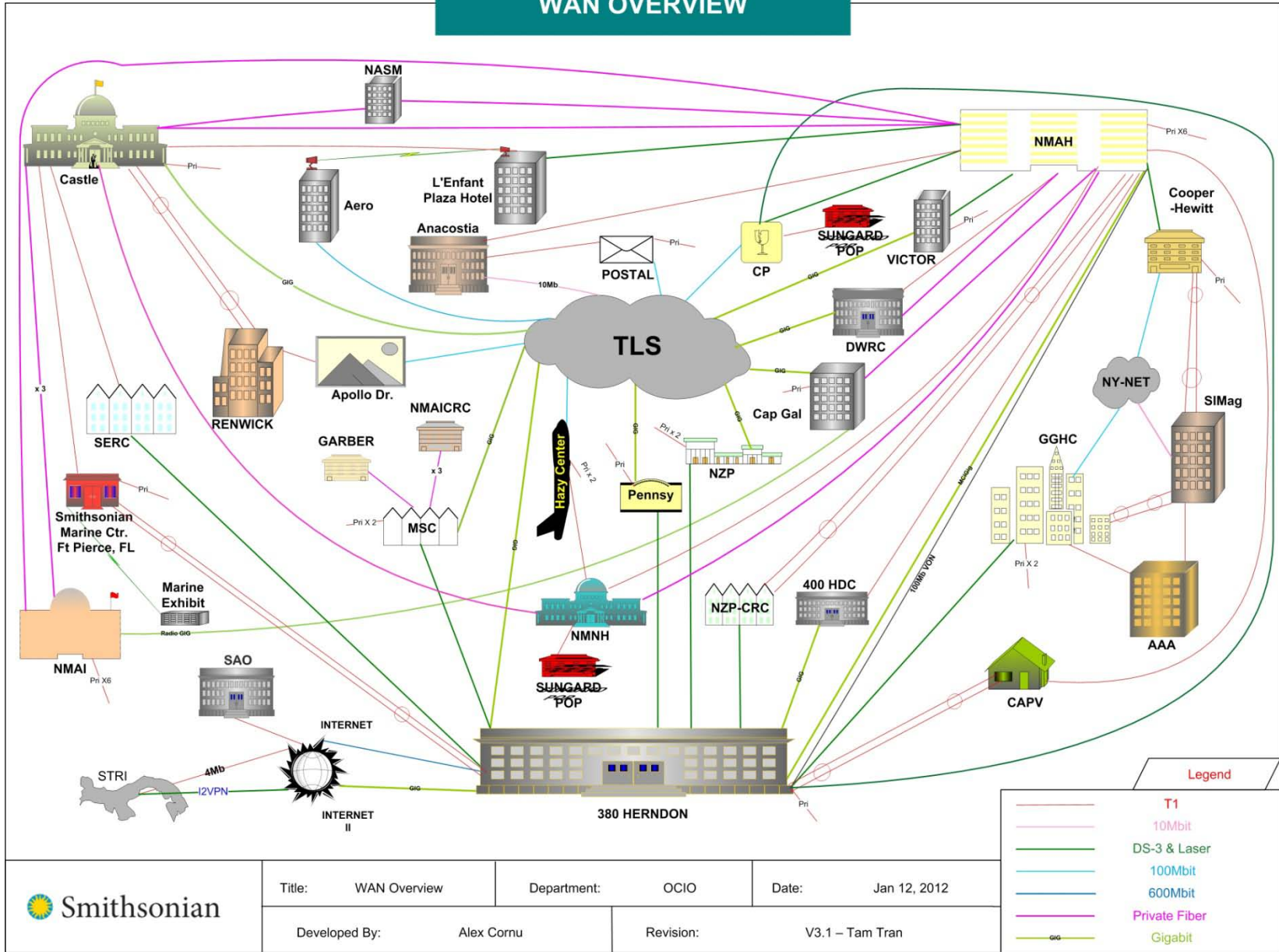
a. Description

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.

WAN OVERVIEW



Title: WAN Overview	Department: OCIO	Date: Jan 12, 2012
Developed By: Alex Cornu		Revision: V3.1 – Tam Tran

Smithsonian Institution Network (SInet) Diagram

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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			
Provide Internet 2 connection	02/2002		03/2002
Increase SInet leased-line bandwidth to DS-3 to NZP	06/2002		04/2002
Increase bandwidth to MSC	10/2001		05/2002
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
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 DS-3 to the SERC in Edgewater, MD	07/2004		01/2005
Increase SInet leased-line bandwidth to 100 MB TLS to SI units in New York	01/2005		06/2006
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		05/2009
Extend SInet			
Extend SInet to Udvar-Hazy Center	09/2003		04/2003
Extend SInet to Apollo Art Collections Storage Facility	07/2004		07/2004
Extended SInet backbone switches to Smithsonian Data Center in Herndon	09/2005		02/2006
Extend SInet to Capital Gallery	04/2006		04/2006
Extend SInet via 100 MB TLS to Crystal City	12/2006		12/2006
Extend SInet via DS3 to Crystal City	12/2006		03/2007
Fiber optic cable run for BCI in STRI	08/2008		11/2008

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Increase redundancy			
Install alternate paths to Walter Reed Greenhouse, North Capitol & Renwick Gallery	06/2002		02/2002
Install redundant core switches for 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
NZP 2nd Point of Presence for Slnet Connectivity	06/2008		12/2008
Upgrade and replace core components			
Installation of gigabit Ethernet backbone switches	12/2001		03/2002
Upgrade Slnet backbone switches to support quality of service and VoIP	01/2003		01/2003
Network router and switch upgrades for STRI to prepare for VOIP	06/2009		05//2011
DNS upgrade for IPV6 and DNSSec	02/2010		01/2010
FTP Redesign	05/2010		12/2009
ListServer Upgrade and Redesign	05/2010		09/2010
NOC Monitoring Display System Upgrade	11/2011		06/2010
Pilot production upgrade to provide 10GB operations in Herndon Data Center for server virtualization	09/2011		09/2011
Slnet Infrastructure Upgrade to enable IPv6			
for all edge/customer facing devices	09/2012		
for all Slnet devices	09/2014		

c. Benefits

Slnet provides network services throughout the Smithsonian. Its continuing enhancement will provide its users the benefits that follow.

- **Greater bandwidth:** Slnet'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

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Protocol version 6 (IPv6) and DNS Security (DNSSec) will put the Smithsonian in line with government mandates and directions. There is a potential that some IPv6 components (e.g. Postini email filtering service and some external web services) may not be upgraded to IPv6 by 2012 but many federal government entities are reporting this possible slip and it may mean that adoption is delayed until vendors comply with IPv6 mandates and stability is proven to be reliable.

- **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 (FY12):	X	Fully Funded Partially Funded Not Funded
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

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9.1.2 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.

By September 2012, we will enable vendor updates provided by Google/Postini thereby enabling IPv6 functionality.

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.

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c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2002
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

9.1.3 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.

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c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

9.1.4 Fiber Optic Ring Network Upgrade

a. Description

For more than a decade the Smithsonian network (SInet) has been extremely dependable in meeting Smithsonian staff needs. Yet the network over the planning period as architected will be strained by increasing traffic coming from video conferencing, mass migrations of data to the DAMs, and the transfer and exchange of large quantities of research data if done within our normal business days. The Fiber Optic Ring project is designed to meet this growing demand generated by Smithsonian staff and programs by upgrading our existing SInet backbone from a mesh of 1 Gbps, 100 Mbps and 45 Mbps links to a 10 Gbps fiber optic ring interconnecting sites located on the National Mall, Maryland and the Smithsonian's Data Center in Herndon. The desired plan is to implement a total turn-key solution to include all dark fiber, optical network equipment and supported by a full maintenance agreement.

We anticipate implementing this project in 4 phases:

- **Phase I:** HDC, NMNH, NMAH, NASM, SIB and NMAI
- **Phase II:** Cap Gallery, MSC, Apollo and/or Pennsy
- **Phase III:** NZP
- **Phase IV:** Victor Building and DWRC.

The project will involve the installation of new fiber optic cable and the use of existing Smithsonian-owned fiber optic cable as applicable and new DWDM optical electronics at each site.

In FY11, OCIO issued a statement of work to determine the feasibility and estimated cost of such an endeavor. Within today's budget limitations, pursuing the upgrade is not feasible in the nearterm but must be addressed during the planning period. If not funded, the alternative will be to implement policies that require staff to conduct some of their Smithsonian work outside of standard business hours.

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b. Benefits

The benefits to this would be to eliminate any existing network backbone congestion and potential congestion in the future as more and more applications are added to SInet. This is a substantial project in both cost and scope to be implemented over multiple years.

c. Status @ a Glance

Funding Status (FY12):	Fully Funded Partially Funded X Not Funded
Production Date:	TBD
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

9.1.5 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 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.

Starting in FY11, all edge/user facing systems need to be converted to native IPV6 to meet federal government mandates. Both Citrix and VPN systems will need to be examined documented, and conversion processes started so that all efforts can be completed by the end of FY12.

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In FY 2010 we built a new Citrix XenApp 5.0 farm incorporating two factor authentication through the use of Entrust Identity Guard tokens. OCIO will be migrating users from the existing Citrix farm to the new farm in FY 2011. Each user will be given a key fob that generates a random code that will be used along with the users account and password to access Citrix. The use of two factor authentication will greatly increase the level of security employed for remote access to the Smithsonian network. 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		12/2009
Configure Xenapp 5.0 in test lab	11/2008		01/2010
Migration Plan	11/2008		01/2010
Migrate Production Users	12/2008	05/2011	
Assess License Usage	12/2008	10/2011	

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.

Upgrading Citrix Presentation server to Xenapp 6.0 puts 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 6.0 that will be of benefit to the Smithsonian's efforts to secure the network.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

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9.1.6 Secure Wireless Infrastructure Design & Development

a. Description

The Smithsonian has adopted secure wireless in museums to complement the exhibitions, and 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.

The wireless security infrastructure design and development project creates 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 to be used 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 initiated in FY 2008 and continuing during the planning period, includes unit-by-unit deployment and reengineering taking into account unit-specific modifications to the generic design. The number of access points deployed each year is dependent on "as available" funding at the unit level.

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b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
<i>Phase 1:</i> Design wireless security infrastructure high-level architecture	09/2005		07/2007
<i>Phase 2:</i>			
Design and test user/device port-level authentication method	09/2005		01/2008
Design & deploy enterprise user/device port-level authentication	09/2006		12/2008
<i>Phase 3:</i>			
Design & develop enterprise user / device port-level authentication	10/2010		10/2010
Deploy SI-wide port-level authentication	09/2006	12/2012	
Transition support to full-time operations support FTE	09/2009		01/2011
Wireless Security Control Improvements	06/2013		04/2011
Add Wireless IT Security FTE	12/2012		
<i>Phase 4:</i> Wireless vulnerability scanning and Penetration Testing	09/2013		04/2011
<i>Phase 5:</i> SI wide Public WiFi Offering	03/2012		

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.

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d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2008
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

9.1.7 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).

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	Apple OS X supports IPv6 beginning with version 10.2. Today the Institution's networked Apple Macintosh workstations are running version 10.5 or 10.6.
Cisco switches & routers	Yes	Cisco's switches and routers, installed at the Smithsonian, are IPv6 compliant.
Cisco Voice over Internet Protocol (VoIP) telephone system	Yes with restrictions	The current Cisco VoIP Call Manager 7.0 and Voicemail do not support IPv6. Several, but not all of our IP phones are IPv6-compliant.
Enterprise Mail System (Postfix)	Yes	

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Device	IPv6 Compliancy	Comments
Lucent Vital QIP	Yes	The Smithsonian uses IPv6-compliant versions to provide DNS and DHCP services.
Microsoft Windows XP	Yes	Microsoft Windows XP with SP1 or 2, or embedded SP1 supports IPv6. Windows 2000 supports IPv6 when patched.
Microsoft Windows 7	Yes	Windows 7 supports IPv6
Microsoft Windows Server 2000 and 2003	Yes	Microsoft Windows Server 2003 supports IPv6. Windows 2000 supports IPv6 when patched.
Sun Solaris	Yes	Sun Solaris 11, 10, and 9 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
Complete the fiscal & operational impact analysis	08/2005		06/2006
Set up an initial IPv6 test environment for IPv6 routing & switching testing	08/2005		01/2007
Install & configure lab equipment	12/2006		01/2007
Conduct initial lab testing for IPv6 transition	03/2007		05/2007

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
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
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	06/2012	
Conduct staff training required for server transition	03/2009	06/2012	
Transition the server environment to a complete IPv6 environment (public facing)	07/2009	09/2012	
Workstation Transition			
Develop training plan for workstation transition to IPv6	02/2010	06/2013	
Identify lab hardware & software requirements for workstation transition to IPv6, and order additional equipment as necessary	03/2010	06/2013	
Develop lab testing requirements for workstation transition	04/2010	09/2013	
Conduct lab testing for workstation transition	05/2010	12/2013	
Finalize workstation transition methodology for IPv6 transition	08/2010	03/2014	
Conduct staff training required for workstation transition	08/2010	03/2014	

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Transition the workstation environment to a complete IPv6 environment	05/2010	09/2014	
A fully functional IPv6 environment (after removing any remaining IPv4 support devices)	09/2010	09/2014	

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 (3.4×10^{38} possible addresses), versus 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.

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d. Status @ a Glance

Funding Status (FY12):

Fully Funded
X Partially Funded
Not Funded

Production Date:

2009 (servers are IPV6-ready to be fully transitioned in FY12)
2015 (*workstations*)

Enterprise Architecture:

X Target Architecture
Candidate for Replacement

Systems Supported:

- SI-wide

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9.2 Network Storage & Backup

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.

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.

As of FY2009, the Institution put in place a fully operational tiered storage of: online, near-line, and offline storage. A complete storage architecture also includes appropriately scaled back-up solutions. During the planning period, the Smithsonian will continue to monitor developments in cloud storage and backups to meet its storage needs. Options on the horizon include joining commercial-cloud solutions, federal cloud solutions, or private cloud solutions.

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9.2.1 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. The Smithsonian's Data Center has implemented a tiered-storage architecture:

- The first tier is online storage which consists of a high performance VNX 5700 SAN and an EMC Isilon X200 array. *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 VNX provides storage to mission critical applications such as email and databases, while the Isilon provides file services. The VNX utilizes fiber channel hard drives; and operates on a fast 4 Gigabit-per-second fiber-channel based backbone and utilizes redundant architecture to provide high performance highly available storage. The Isilon array utilizes 10Gbps Ethernet and iSCSI connections to servers over a dedicated VLAN.
- 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 Isilon NL array. The Smithsonian previously used an EMC Centera for archival of all Microsoft Exchange email since February 2007. In FY12/13 OCIO will be migrating all data from the Centera platform to the new Isilon storage with plans to retire the Centera platform thereafter.
- 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 was replaced in FY 12 with Quantum DXi disk based storage arrays. OCIO procured and implemented a total of 6 DXi units to provide storage for the first copy of the Institution's backups as well as a disk-to-disk replicated second copy of the backup images. The Smithsonian also has a tape library that was upgraded from an ADIC i2000 to a Quantum i6000 tape library for off-line storage. This Smithsonian also employs an IBM Magstar tape library and the Tivoli Storage Manager for archive of collections digital assets. The DXis and the i6000 are part

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of the Enterprise Backup infrastructure at the Smithsonian that is detailed in section 6.2.6.

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.

The last enterprise online storage assessment conducted in 2008 found that:

- 54% of files being stored were large than 25 Mbytes
- 62% of files had 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 were duplicate files

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
Capacity Planning Tools Implemented	04/2009	09/2012	
Tiered storage architecture solution for office automation files	07/2009	06/2011	09/2011
Implement Enterprise Email Archiving Solution SI-wide	09/2009	12/2012	
Expand storage	TBD		

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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.

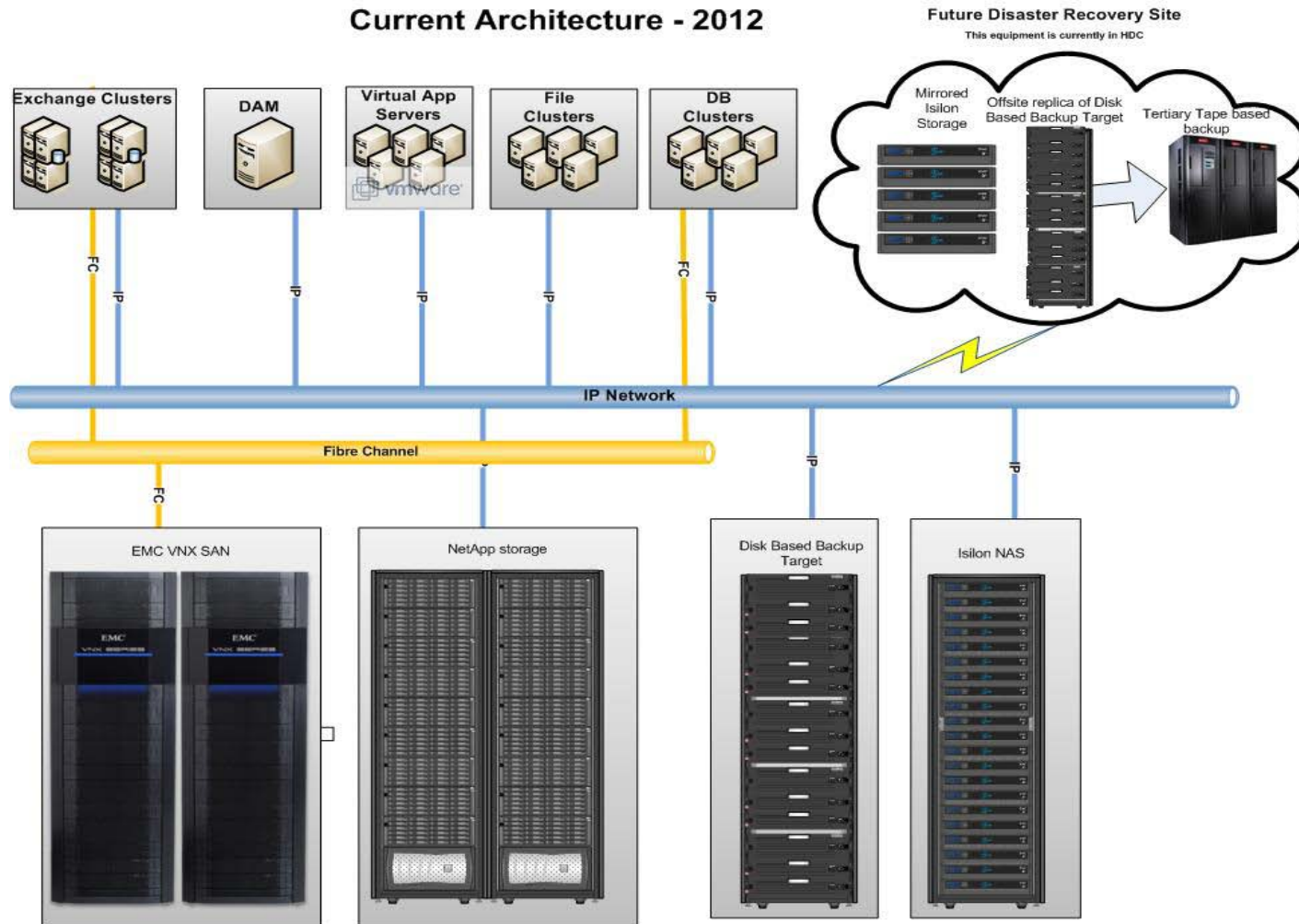
d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

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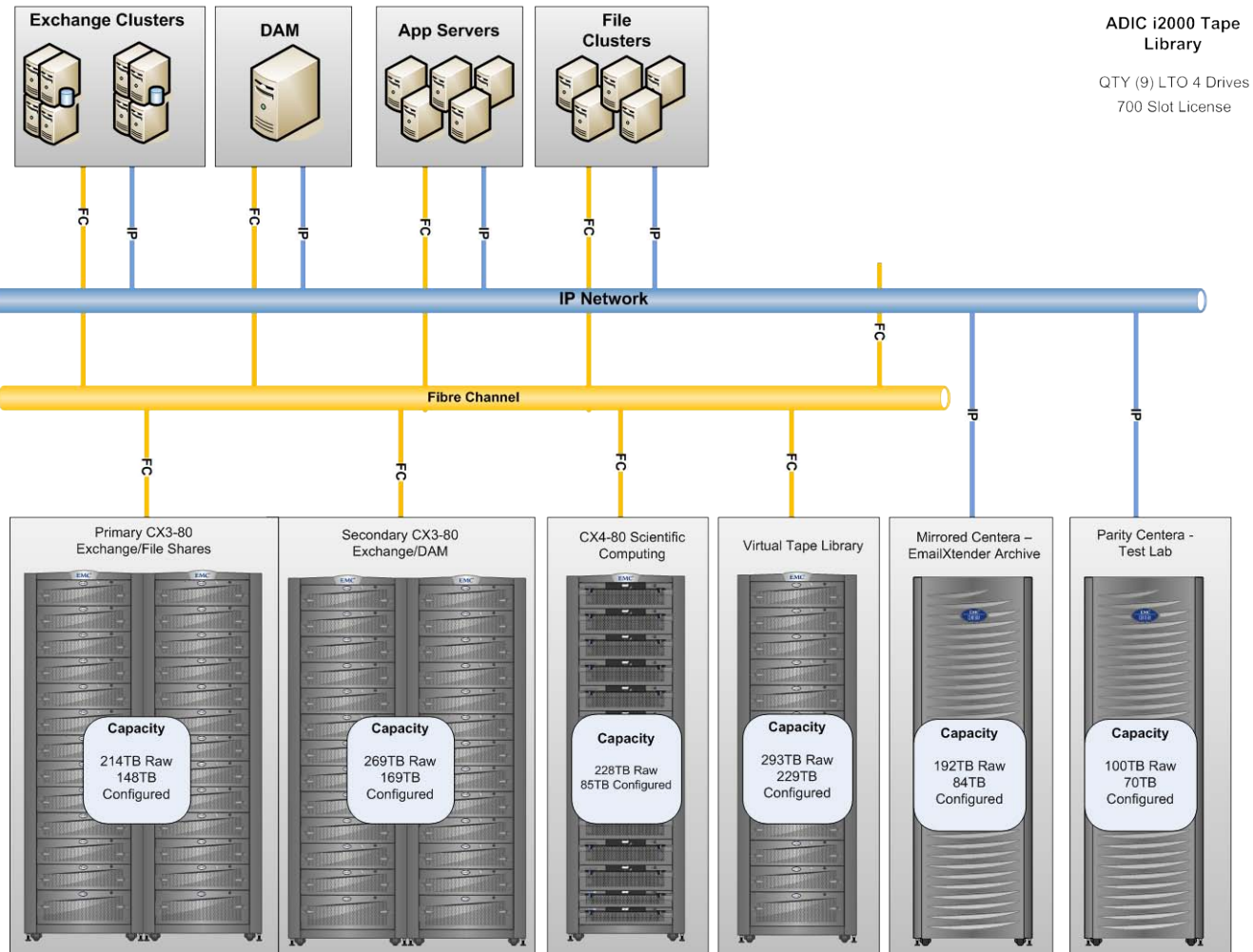


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Previous Enterprise Storage and Backup Architecture (as of Dec 2011)



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9.2.3 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 FY 2012, OCIO completed a major redesign of the enterprise backup system retiring the Virtual Tape Library (VTL) and ADIC i2000 tape library, and installing a Quantum DXi device. One of the challenges that the Smithsonian Institution's dynamic nature poses to the Data Center environment is the constant growth of digital content that needs to be protected and the pace at which it changes. The design of the new backup infrastructure puts more of a focus on performance and expandability so that as the Institutions data sets grow, the backup system will be able to keep up with the demand placed on the backup infrastructure better positioning it to meet future needs in a cost effective and flexible manner.

The new Quantum DXi devices differ from the virtual tape library (VTL) technology previously employed by the Institution in a number of key ways:

1. Uses TCP/IP protocol as opposed to Fibre channel
2. Backup images are stored on file shares as opposed to virtual disk units
3. The backup load is distributed across 3 DXi devices for improved performance
4. Data Deduplication is used to more efficiently store backup images

In addition to the introduction of the Quantum DXi disk based systems, the physical tape library has been upgraded to a Quantum i6000. The i6000 offers improved performance and expandability over the previous i2000 model.

The backup application has also been upgraded to Symantec NetBackup 7.1 which offers performance improvements and support for new technologies such as virtualization..

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.

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c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

9.3 Smithsonian Data Center

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. The Institution's data center in Herndon houses 673 servers, wide-area network (WAN) routing, and network backbone switches.

9.3.1 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.

In FY2012 the Herndon Data Center received several key improvements. OCIO has worked in conjunction with OFEO staff to increase the efficiency of the data center making it more of a "Green" facility. In support of green initiatives, several of the computer room air conditioner units were replaced in FY 2012 with more efficient models that use a new generation of refrigerant that is more environmentally friendly. In FY2012 OFEO installed cold isle partitions that keep the cooled air restricted to the areas of the data center that house the devices that need cooling. OFEO also worked with OCIO to install air plenums on the computer room air conditioners intake to help remove hot air from the data center.

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OCIO continues to work closely with OFEO on efforts to reduce energy consumption and improve efficiencies within the Herndon Data Center. In addition to the joint efforts with OFEO, OCIO is also working on reducing energy consumption by reducing the amount of equipment housed in the data center through virtualization technologies.

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. 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.

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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.

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9.3.2 Network Server Administration

a. Description

The Smithsonian provides centralized services for directory, file and print, email, and office automation applications. Directory services for the Institution are provided by OCIO through the use of Microsoft Active Directory and all staff are utilizing Microsoft Exchange / Outlook for email services; use of 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.

In FY2012 OCIO upgraded the Active Directory Infrastructure to Windows Server 2008 R2. The Windows Server 2008 R2 platform is the latest Windows server operating system and offers increased performance and security features over the previous version of Windows Server.

In FY2012, OCIO replaced all of the print servers with new Print servers that are hosted in the Institutions virtual server environment. The new print servers offer support for printing with Windows 7 64-bit workstations. The new print environment is more highly available by virtue of the fact that it is hosted in the virtual server environment which reduces the potential for down time of print services.

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 *System Center Configuration Manager (SCCM)* (a desktop configuration management, remote workstation operation, and automated software distribution utility).

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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 (FY12):	X	Fully Funded Partially Funded Not Funded
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

9.3.3 Network Server Replacement Program

a. Description

Today OCIO manages and operates over 538 servers (425 Windows, 113 Solaris/Unix) and 884 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.

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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:			
Replaced 26 servers	09/2008		01/2009
FY 2009:			
Replaced 30 servers	09/2009		08/2009
Retired/decommissioned 38 servers	09/2009		09/2009
FY 2010:			
Replaced 23 servers	09/2010		9/2010
Retired/consolidated 103 servers	09/2010		9/2010
FY 2011:			
Replaced 15 servers	09/2011		9/2011
Retired/consolidated 50 servers	09/2011		9/2011
FY 2012:			
Replace servers	09/2012		
Retire/consolidate servers	09/2012		

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 (FY12):	X	Fully Funded Partially Funded Not Funded
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide (OCIO managed)

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9.3.4 Server Virtualization

a. Description

Traditionally a server in the Herndon Data Center was comprised of a piece of dedicated hardware with an operating system installed on it, and an application or services installed that provide some type of functionality to the Institutions user base (file share, database, email services, etc.). Often times the services or applications that were running on the server don't take full advantage of the resources that are available on the hardware (processor power, memory, etc.). With server virtualization it is possible to run multiple server instances on a single piece of hardware. Each server instance runs on top of a host operating system that controls the allocation of-- and access to--the hardware resources available. There are a number of benefits to operating in a virtual server environment including, reduced hardware costs, reduced consumption of power and cooling resources, and more efficient administration.

OCIO began the process of evaluating the available virtual server host platforms in March of 2009. A technical working group was established and core requirements were identified. An evaluation was conducted and test environments were built on the three major platforms available, Microsoft Hyper V, Citrix XenServer, and VMWare. Based on testing and evaluation that was conducted by the technical working group and industry research it was determined that the VMWare platform was the platform that will best meet the needs of the Institution.

In August of 2009 the first production pilot VMWare environment was implemented. The Office of Systems Modernization of OCIO was able to virtualize a number of servers that are part of the Enterprise Resource Planning system with great success. The results of the pilot have lead to increased efficiency and a reduction of operating cost.

In August of 2010 OCIO conducted a virtualization assessment to determine the feasibility of virtualizing additional servers within the data center. Server statistics were gathered and it was found that 91% of the servers analyzed were ideal candidates for server virtualization. The assessment found that many of the servers housed in the Smithsonian's Data Center were vastly underutilized. The average CPU utilization across the data center was found to be 3.02%. It was determined that moving forward with a large scale virtualization implementation would be beneficial for the Institution. Based on the data gathered through the assessment, OCIO purchased the hardware and VMWare licensing required to move forward with the virtualization efforts in September 2011. In January 2011, OCIO began work to design and implement a large scale VMWare server farm.

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In FY2012 OCIO completed the implementation of a virtual server infrastructure that will support the Institutions virtualization efforts. In addition, OCIO began eliminating physical servers in the data center by converting them to virtual server instances. Priority was given to servers that were identified in the previous assessment as being good candidates for virtualization. As of April 2012 OCIO has converted 51 servers from physical to virtual and decommissioned the old hardware. There are over 80 server instances being hosted in the virtual server environment to date.

OCIO will continue virtualization efforts in 2012 and beyond. The virtual server infrastructure will allow OCIO to reduce operating costs and improve efficiencies moving forward.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Form Technical Working Group on Virtualization platforms	03/2009		03/2009
Select virtualization platform	06/2009		06/2009
Implement Pilot with ERP application servers	08/2009		08/2009
Decision to implement virtual server infrastructure for Slnet systems	06/2010		06/2010
Perform Data Center Assessment to identify virtualization candidates	08/2010		08/2010
Procure hardware	09/2010		09/2010
Procure VMWare licenses	09/2010		09/2010
Complete architectural design of VMWare server farm	03/2011		3/2011
Initial implementation of VMWare server farm	03/2011		4/2011
Establish schedule for converting physical servers to virtual	04/2011		4/2011

c. Benefits

Virtualizing the server infrastructure will reduce operating costs and increase administrative efficiency: reduces number of servers and therefore reduces hardware costs; fewer servers reduce the power and cooling costs creating a more green data center environment; with fewer servers administrative tasks are simplified.

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d. Status @ a Glance

Funding Status (FY10):	X	Fully Funded Partially Funded Not Funded
Production Date:		2011 (pilot)
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

9.3.5 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 all 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 Smithsonian 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 disaster recovery plans for systems relocating to the alternate site is exercised annually at the SunGard computer facility in Philadelphia. The plan tests the disaster recovery plans of four major systems. The remaining 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); 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.

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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. 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.

c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:	2002	
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Systems Supported:		<ul style="list-style-type: none">• ERP• CACS• FMS• Medgate• PAYES• SIRS• System Explorer• WebTA• VCMS

9.4 Telecommunications

9.4.1 Voice Network Services

Voice network services for all units include operating and maintaining: telephone lines and equipment, voice mail systems, cellular mobile device 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.

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9.4.2 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. 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	01/2003		01/2003
VoIP @ Hirshhorn, Freer-Sackler Galleries, NASM Udvar Hazy Phase 1 and Phase 2, NMAH, and National Postal Museum	2003		2003
VoIP @ Renwick Gallery; NMAfA; NMNH; and NMAI Mall Museum/Phase 1, 2, and 3; NYC locations (Cooper-Hewitt, NMAI Heye Center, AAA & SI Magazine); and Apollo Art Storage Facility	2004		2004
Implement Emergency Response System	05/2004		05/2004
Implement Emergency Broadcast System	06/2004		06/2004
VoIP @ NMAI Cultural Resources Center, NZP, L'Enfant Plaza, NASM Garber Facility, North Capital Facility, Anacostia Community Museum, Aerospace Building, and Walter Reed Greenhouse	2005		2005
VoIP @ Smithsonian Data Center, Patent Office Building Phase 1 and Phase 2, Castle, and Capital Gallery	2006		2006
VoIP @ Crystal City	01/2007		05/2007
VoIP @ Victor Building	01/2007		07/2007
VoIP @ Fort Pierce SMS	11/2007		11/2007

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
VoIP @ STRI (Panama)	07/2009		07/2011
VoIP @ NZP Conservation & Research Center	09/2009		11/2009
VoIP @ SERC	05/2010		05/2011

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.

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d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2003
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

9.4.3 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 for 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.

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.

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c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2005
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

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9.4.4 Mobile Device Management (MDM)

a. Description

Implementing a Mobile Device Management (MDM) system which will help the Smithsonian Institution to manage the complexity of controlling and operate its growing mobile devices installed platform. MDM technology provides enterprises with feature rich mobile devices to deliver voice, data and applications to their users – wherever they are located –while allowing the Smithsonian to maintain security that meets employee requests for a greater choice of mobile devices. This seamless interface between mobile users and the enterprise creates business efficiencies by increasing productivity through availability, inter-organization collaboration and reduced communication costs.

As mobile devices grow in popularity in enterprises, management complexities beginning to arise — from the cost of the services associated with the devices, to the security and policy that mobile devices should follow. Mobile devices such as smartphones and tablets are increasing in power and memory, and, although they are not replacing PCs on a full-time basis, they are often used as primary communication devices with access to network files and applications. Also, the number of vendors and platforms in the mobile device market continues to increase adding complexity to this environment.

MDM is being implemented in two distinct phases:

- **Phase I, Office of Facilities Engineering & Operations (OFEO):** MDM Phase 1 was initiated from and is being executed as part of the Facility Mobile Work Manager (FMWM) project--a mobile companion application for Facility Center, a major application within SI's Facility Management System (FMS). The scope of Phase 1 is limited to implementing MDM software to manage 400 new iPhones that will be acquired by the OFEO as part of the FMWM project.
- **Phase II, Smithsonian-Wide:** Building upon the experience of the Phase 1 implementation, we will expand the use of MDM system from its initial implementation in OFEO to Smithsonian-wide. This phase will identify additional requirements from the broader Institution stakeholders (central offices, units, and museums) and perspectives (internal-staff and external public) to be integrated into the existing infrastructure to effectively manage mobile devices and their associated software from a central location.. This phase will also address the definition and creation of mobile device management policies, procedures.

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b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Phase I: OFEO Pilot			
Requirements	08/2011		08/2011
Select Vendor	12/2011		02/2012
Acquire and Install Tool	03/2012		
Production Phase I	03/2012		
Phase II: SI-Wide			
Additional Requirements Definition	12/2013		
Implementation and Support	12/2014		

c. Benefits

The MDM will allow central offices, units, and museums to:

- Maintain security while meeting employee requests for a greater choice of devices
- Perform asset management and remote troubleshooting
- Optimize the functionality and security of mobile communications
- Reduce support costs and business risks
- Facilitate more effective and efficient use of information, communication and entertainment devices
- Provide administration capabilities and reporting
- Policy enforcement
- Provide security and compliance

d. Status @ a Glance

Funding Status (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	2012
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Systems Supported:	<ul style="list-style-type: none"> • OFEO (Phase 1) <ul style="list-style-type: none"> • SI-wide (Phase 2)

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9.4.5 Centralized Video & Web Conferencing

a. Description

Centralized Video and Web Conferencing provides a centrally supported conferencing standards for all Smithsonian units purchasing equipment. 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.

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, SCBI, 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, MeetingPlace, integrating the VoIP Call Manager and the MeetingPlace Audio Server.. 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.

The objectives of the Centralized Video & Web Conferencing are:

- Create a unified video and web conferencing environment across the entire Smithsonian
- Reduce the cost for video and web 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. Benefits

A centrally integrated and managed environment fosters better integration of conference scheduling services across units, making equipment interoperable,

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better support for emerging technologies, easier administration, and better and faster troubleshooting.

c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2008
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Systems Supported:		• SI-wide

9.4.6 Desktop Video Conferencing (Vidyo)

a. Description

As staff embraces videoconferencing as a business tool, there has been an increasing demand to videoconference from the desktop—as done with Skype. The Smithsonian has deployed the Vidyo system, which is complementary to the existing Videoconference technologies already deployed within the Smithsonian and meets security requirements.

This new system is a centrally managed application that installs a small component at the desktop that maintains connectivity to a portal where direct connections or meeting rooms are established to allow point to point and multi point communications. Vidyo allows internal and external audio and video conferencing, as well as the ability to display the computer screen to all participants. Vidyo also supports “desktop” video conferencing with iPads and smartphones via freely available applications.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Initiate Project	08/2010		08/2010
Install Vidyo Portal and Gateway	01/2011		01/2011
Configure Vidyo Portal and Gateway	02/2011		01/2011
Pre-Production Test	02/2011		02/2011
Evaluate and adjust according to results of pre-production testing	03/2011		03/2011
Establish Account Management and Helpdesk processes	03/2011		04/2011
Production	04/2011		06/2011

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c. Benefits

The Vidyo HD desktop videoconferencing system makes impromptu and scheduled video communication accessible while in or away from the office. Since the system is controlled by the user there is no need for additional technical resources to schedule or configure rooms to accommodate videoconferences. It also offers a free utility allowing Smithsonian staff to meet virtually over the Web with collaborators who are external to the Smithsonian – a desire long expressed by Smithsonian researchers.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

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9.4.7 High Definition TelePresence Conferencing

a. Description

TelePresence offers a high definition videoconference system utilizing a telephone as its control mechanism to establish connections and operate the system. The system has the capacity to call point-to-point, and multi-point. The high-definition video requires each point to have a TelePresence device, otherwise it is compatible with standard video conference devices.

b. Benefits

TelePresence offers High Definition videoconferencing that provides a more equivalent in-person experience. The donated systems were installed in 2011. We will monitor their usage and benefits to determine whether this technology meets Smithsonian needs.

c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		<ul style="list-style-type: none">• OCIO• NYP• STRI• SCBI• SERC

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9.5 Customer Support Services

9.5.1 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, research, 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 lifecycle beginning in FY 2004—about 1,500 PCs each year plus smaller numbers of workstations and local and network printers. The four-year replacement lifecycle 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.

Starting in FY 2011, the program ceased covering local printers. This was done in preparation for a sustainability-related project to reduce the overall number of printers in use at the Institution.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
FY 2004 Hardware Replacement:			
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:			
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

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Replace 83 Scientific Macs	09/2007		09/2005
FY 2006 Hardware Replacement:			
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:			
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:			
Hardware Replacement Plan	08/2007		07/2007
Replace Desktop PCs	03/2008		04/2008
Replace Workstations	04/2008		07/2008
Replace Printers	06/2008		07/2008
FY 2009 Hardware Replacement:			
Hardware Replacement Plan	08/2008		10/2008
Replace Desktop PCs	03/2009		n/a ³
Replace Workstations	04/2009		07/2009
Replace Printers	06/2009		11/2009 ⁴
FY 2010 Hardware Replacement:⁵			
Hardware Replacement Plan	08/2009		08/2009
Replace Desktop PCs	03/2010	04/2010	07/2010
Replace Workstations	06/2010	07/2010	07/2010
Replace Printers	07/2010	08/2010	08/2010
FY 2011 Hardware Replacement:⁶			
Hardware Replacement Plan	08/2010		04/2011
Replace Desktop PCs	12/2011	03/2012	
Replace Workstations	05/2011		n/a
Replace Printers	08/2011		n/a

³ Because of funding cuts, large scale PC replacements were not done in FY 2009. Instead, only those PCs that failed were replaced.

⁴ Hewlett-Packard manufacturing delays caused 4+ month waits for the delivery of some printers.

⁵ The start of hardware replacements in FY 2010 was deferred by two months as a result of the Smithsonian being under a continuing budget resolution.

⁶ Due to FY11 budget uncertainties, funds were not released until late in FY11 delaying the deployment of the FY11 PCs. There were not adequate funds for the planned replacement of workstations and printers; instead these devices will only be replaced if they fail and there is adequate funding to purchase replacements.

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
FY 2012 Hardware Replacement:⁷			
Hardware Replacement Plan	TBD		
Replace Desktop PCs	TBD		
Replace Workstations	TBD		
Replace Printers	TBD		

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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2003
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Systems Supported:		• SI-wide

⁷ As of January 2012, the start of the project has been deferred pending determination as to how much funding will be available for replacements. Some FY 2012 funding has been used to purchase the PCs needed to complete the FY 2011 PDHRP effort.

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9.5.2 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. Operating systems are generally upgraded to the newest versions in conjunction with replacement of desktop computers and workstations. Because of the 4-year life-cycle for most desktop computers and workstations, the Institution will be running and supporting multiple operating system versions for a number of years.

Desktop Software	
Operating system	<ul style="list-style-type: none">• Windows XP Professional• Windows 7 Professional• Mac OS X
Applications	<ul style="list-style-type: none">• Microsoft Office 2007 (PCs)• Microsoft Office 2008 (Macs)• Microsoft Office 2011 (Macs)
Internet browser	<ul style="list-style-type: none">• Internet Explorer 7• Internet Explorer 8
Electronic mail client	<ul style="list-style-type: none">• Outlook (PCs)• Entourage (Macs)
Anti-virus software	<ul style="list-style-type: none">• McAfee VirusScan• EPO Client• Virex

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9.5.3 OCIO Help Desk System (HEAT)

a. Description

The HEAT system is used by information technology (IT) help desks and support personnel throughout the Institution to track and manage reports of computer problems as well as requests for IT services. HEAT is also used to track desktop hardware replacements made through the Periodic Desktop Hardware Replacement Program. The system is COTS software specifically designed for use in an IT environment. Records containing information about the customer, the nature of the problem or request, and the resolution are stored in an SQL database. In addition to tracking individual requests the aggregate data is used for workload reports and trend analysis, to improve the quality and timeliness of IT support. Over 55,000 requests are logged into the system annually.

In addition to being used to track and manage IT problems and requests, HEAT is being used for tracking some non-IT related work. Specifically, NMNH manages exhibit maintenance related tasks; the GovTrip Help Desk records and tracks customer problems; and SIA manages requests for archival materials.

The HEAT system has been upgraded as new versions of the system have been released. These are obtained as part of the annual maintenance cost and do not require additional funding. The most recent upgrade was performed in September 2009. There are no planned upgrades at this time, but as releases are issued OCIO will determine if any new functionality warrants their implementation. A new HEAT version is expected to be released by the vendor in 2012 and OCIO will evaluate it for possible implementation.

b. Benefits

The HEAT system provides an enterprise wide way to record and track IT incidents and service requests. This allows all IT staffs to share information about IT problems and requests across organizational boundaries. It also serves as a basic knowledge base for IT staff.

c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2003
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

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9.6 Environmentally Friendly Computing

a. Description

Environmentally Friendly Computing (“Green Computing”) is an effort to ensure that IT efforts are performed with energy efficiency and with minimal environmental impact. Additionally, a goal is to store and dispose of IT by-products in an environmentally responsible manner.

To support this initiative, OCIO has centralized computing resources from the units to the Herndon datacenter. At the datacenter itself, energy utilization is tracked with an eye toward minimizing electrical consumption and heating impact. Excess or end-of-life IT and office productivity electronics are collected and degaussed by OCIO to ensure no Smithsonian data leaves the Institution inadvertently, and Smithsonian utilizes the Dell Asset Recovery Service to dispose of excess IT equipment in an environmentally sound manner.

Server virtualization (a technique for converting physical computers to simulated software versions) is an emerging technology that can be used effectively to lower complexity, provisioning time, power/heating concerns. In FY 2011, the Smithsonian expanded the virtualization pilot program.

In addition to server-side changes, the Smithsonian is implementing a power management utility for desktop and laptop computers, and monitors. Idle computers not otherwise exempt from power management policies will be configured to enter a low power state such as “standby” during periods of inactivity. In FY 2010, the Institution purchased NightWatchman and is in the process of defining the energy management settings and identifying specific machines and programs that must be exempt from energy management policies. OCIO completed deployment to all Smithsonian machines by the end of FY 2011. Energy savings will be realized by reduced energy to power the laptops and desktops, as well as to minimize air conditioning needs to cool areas where the devices are located.

In compliance with a government best practice, OCIO strives to extend the usable life of issued desktop computers from 3 to 4 years (as budget permits) through the implementation of our periodic desktop replacement program, and purchase only EPEAT compliant desktops and laptops. It should be noted that plan-wide savings is achieved by not extending the warranty on “old gear,” rather we run without coverage for those elements of the pool thus effected—and ensure availability from the covered pool and spare parts.

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b. Benefits

Green computing requires in part responsible stewardship of Smithsonian's technology resources. Besides adhering to the emerging national and international guidelines for environmentally sustainable practices, green IT has some added benefits that extend beyond the IT function:

- It directly reduces carbon dioxide emission consequences of IT by implementing a more energy efficient infrastructure.
- It indirectly reduces carbon dioxide emission consequences by providing technological capabilities such as video conference/telepresence that can greatly reduce the requirements for business travel.
- It indirectly reduces carbon dioxide emission consequences by providing remote telework infrastructure that reduce or eliminate employee commutes and reduce office space footprint.
- It reduces operational costs by forcing the review and streamlining of processes, the adoption of standards, reduction of redundant processing and the conversion to energy-saving hardware choices.
- It provides positive PR, demonstrating how the Institution is a good steward of the environment and the public trust.

c. Status @ a Glance

Funding Status (FY12):

- X Fully Funded
Partially Funded
Not Funded

Production Date:

Enterprise Architecture:

- X Target Architecture
Candidate for Replacement

Systems Supported:

- SI-wide

CHAPTER 10

ENTERPRISE IT SECURITY PROGRAM

10.1 Overview

The Smithsonian is committed to ensuring that the Smithsonian's information technology infrastructure and its systems are secured. In order to protect common IT investments and to support unit IT requirements, the OCIO works to balance IT security and business need in the enterprise.

The Smithsonian Institution is not subject to the E-Government Act of 2002 / Title III and the Privacy Act of 1974 and the OMB guidelines implementing those Acts. To the extent that Federal Information Security Management Act (FISMA) and OMB guidance reflect best practices are reasonable and are not in conflict with the Institution's own statutory obligations (*the increase and diffusion of knowledge*) it is the Institution's practice, based on available security resources, to secure its designated FISMA inventory with the provisions of the Act.

The mission of OCIO's Computer Security Office is to provide Information Technology (IT) security to the Institution and in doing so to protect the Smithsonian's users, computers, systems and data by:

- **Providing IT Security guidance to Smithsonian Units, Offices and System Sponsors based on published:**
 - Smithsonian Directives (SDs) on IT security policies
 - Technical Standards and Guidelines (TSGs) for IT security requirements
 - Technical Notes (TNs) for IT security procedures
 - Contract language guidelines for IT security acquisitions and system outsourcing
- **Optimizing the Institution's IT security based on work with the various OCIO divisions supporting:**
 - Systems Architecture and Product Assurance for infrastructure, wireless networks and websites
 - Network Management Security Operations Center operation of firewalls, vulnerability scanners, intrusion detection systems, end point system protection including anti-virus, and incident handling
 - Customer Support Services for desktop IT security standards and desktop protection
 - Data Center Operations and Network Servers IT security baseline standards for operating systems, databases and enterprise services

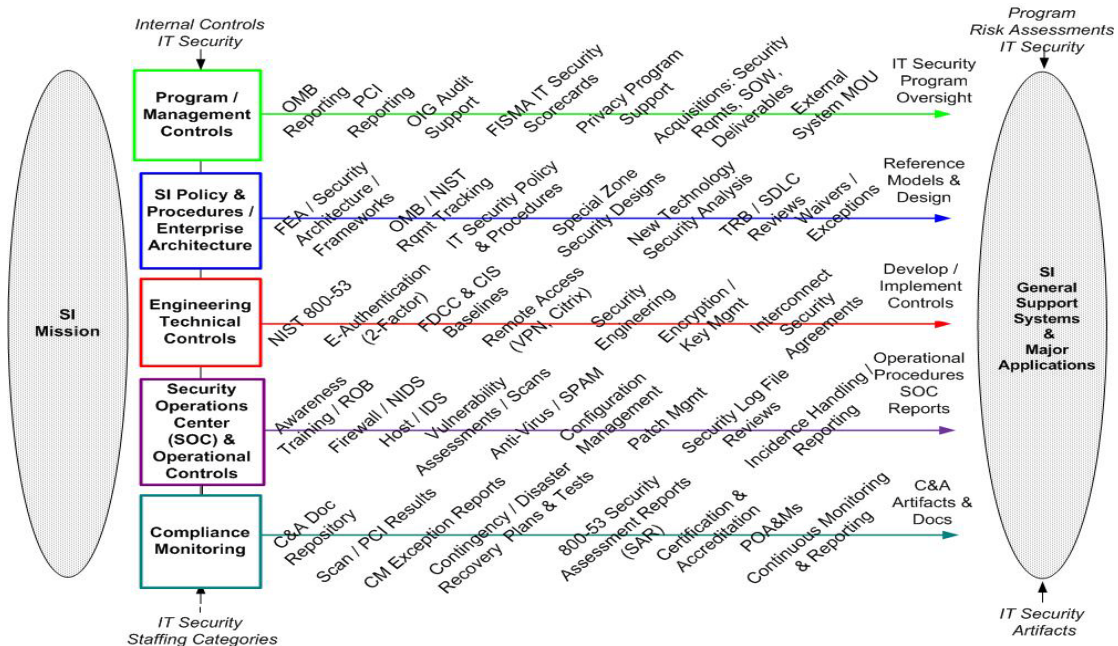
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- Technical Review Board (TRB) and Change Control Board (CCB) IT security impact reviews of new technologies, systems and applications
- **Supporting Federal Information Security Management Act (FISMA) best practices and for managing IT security reviews for SI designated systems in order to provide:**
 - FISMA System Assessments and Authorizations
 - FISMA Systems Tracking Scorecard
 - Support for the Office of the Inspector General (OIG) Annual Audit on the IT Security program
 - Support for the Secretary's annual FISMA report to OMB / DHS and Congress on the Institution's IT security program
 - Mission and system sponsors with an understanding of IT security risks based on common infrastructure; common security controls; internally supported and externally hosted systems and applications
- **Providing IT Security communications and outreach to the enterprise based on:**
 - Computer Security Awareness Training (CSAT) for all employees and staff who have computer accounts
 - Specialized IT security training based on the Institution's policies, procedures, processes and requirements
 - PRISM2 web and collaboration sites for IT security
 - IT Security Committee (ITSC) and working groups for IT security

As illustrated below, the OCIO's IT security program identifies five (5) general categories of support.



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The OCIO security program provides the Institution with system assurance that the confidentiality, integrity and availability of our FISMA designated systems are based on federally recommended security guidelines and practices from:

- National Institute of Standards and Technology (NIST) Security Controls
- Open Web Application Security Project (OWASP)

The overall benefits of having an IT Security Program include:

- Optimized support for common management, technical and operational controls
- Consistent assessments of IT Security Risks
- Improved understanding of IT Security by the units and OCIO

As the Smithsonian increasingly relies on IT to support its mission, the possibility of a security breach affecting the common infrastructure, a system or application increases. Such a breach would result in more than embarrassment to the Institution. Failures in IT security in the areas of protections, detections and corrections can be costly to repair, and the loss of productivity would be a drain on already limited IT and mission resources.

As illustrated in the previous figure, additional descriptions of the Enterprise Security Program have been identified in the following sections:

- Section 10.2 Program Management Controls
- Section 10.3 Enterprise Architecture / SI Policy and Procedures
- Section 10.4 Security Engineering / Technical Controls
- Section 10.5 Security Operations Center (SOC) / Operational Controls
- Section 10.6 Assessments and Authorizations

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CHAPTER 10: ENTERPRISE IT SECURITY PROGRAM

10.2 Program / Management Controls

a. Description

The following IT Security Program Management (PM) controls are supported by the OCIO to the level that resources allow. The TSG IT-930-02, *Security Controls Manual*, Section 2, identifies recommended procedures and additional guidance for eleven (11) IT security program management controls.

Table 1. IT Security Program Management Controls

Program Control	Responsible Organization
Information Security Program Plan (PM-1)	Chief Information Officer (CIO)
Senior Information Security Director (PM-2)	Director Computer Security
Information Security Resources (PM-3)	CIO
Plan of Action and Milestone Process (PM-4)	Director Computer Security
Information System Inventory (PM-5)	Chief Technology Officer (CTO)
Information Security Measure of Performance (PM-6)	Director Computer Security
Enterprise Architecture (PM-7)	CTO
Critical IT Infrastructure Plan (PM-8) (Note: HSPD-7 is not applicable to SI.)	CIO
<ul style="list-style-type: none"> • Managed IT Infrastructure (SInet) CP/DRP • Enterprise Resource Processing Systems (ERP FIN, ERP HRMS, ERP WebTA, FMS) CP/DRP • Smithsonian’s Disaster Management Master Plan Continuity of Operations Plan (COOP). 	OCIO Director of the Office of IT Operations OCIO Director Office of System Modernization (ERP Systems) OFEO Office of Protection Services (OPS) Manager Disaster Program Management
Risk Management – IT Security (PM-9)	<ul style="list-style-type: none"> • Unit Mission Sponsors • Unit IT Systems Managers • CIO • Director Computer Security
Security Authorization Process (PM-10)	<ul style="list-style-type: none"> • Unit Mission Sponsors • CIO • Director Computer Security
Mission / Business Process Definition (PM-11)	<ul style="list-style-type: none"> • CIO • CTO

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In addition to providing the foundation for the Smithsonian IT Security program, the IT Security PM controls support the following activities:

- 1) **OMB FISMA Reporting.** While the Institution is not subject to the E-Government Act of 2002, Title III Federal Information Systems Management Act (FISMA), the Institution voluntarily reports our annual compliance based on OMB A-130 reporting requirements. The OCIO Director of Computer Security supports the DHS Cyberscope reporting activities.
- 2) **OIG FISMA Audit Support.** The Smithsonian Office of the Inspector General (OIG) directs an annual independent audit which documents the institution's compliance to FISMA. The OCIO IT Security Staff supports the OIG's annual FISMA compliance reviews.

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
FY08 FISMA Program, Reports and OIG Audit Support	10/2008		02/2009
FY09 FISMA Program, Reports and OIG Audit Support	10/2009		11/2009
FY10 FISMA Program, Reports and OIG Audit Support	10/2010		11/2010
FY11 FISMA Program, Reports and OIG Audit Support	10/2011		11/2011
FY12 FISMA Program, 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.

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d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2009
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

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10.3 IT Security Policies and Procedures

a. Description

- 1) **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 Standards (FIPS). For any small agency it is a challenge to keep current in reviewing the guidance and determining applicability, value and projected implementation costs.
- 2) **Smithsonian IT Security Policy and Procedures.** The OCIO provides reviews and updates to Smithsonian IT security policies and procedures for the following documents:
 - Smithsonian Directives (SD)
 - IT Security Policies - Technical Standards & Guidelines (TSG)
 - IT Security Procedures - Technical Notes (TN)
 - FISMA Document templates and artifacts

Regular updates to Smithsonian policy and procedures are needed in order to keep the Smithsonian up-to-date with OMB and NIST guidance.

- 3) **IT Security Zones.** The Smithsonian has architected IT Security zones in order to satisfy mission needs and provide appropriate operational security protections to the institution. Zones exist in order to segregate traffic types, and to control traffic between zones. Enterprise Architecture documents IT Security zone design assumptions and review controlled interfaces between zones. Multiple zones are being supported:
 - *Public Access Zone (DMZ).* Publically accessible Web and FTP servers are located in the Public Access Zone.
 - *Guest / Visitor Zone.* The guest/visitor zone establishes a segregated 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.
 - *Exhibit Zone.* The exhibit zone establishes a segregated network that allows access only to the Internet and Smithsonian public facing servers. The Exhibit zone meets 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.

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- *Remote Access Zone.* The remote access zone provides support for the Institution's remote access technologies, including VPN and CITRIX.
 - *Commerce Zones.* The commerce zones establishes segregated networks for electronic commerce at the Smithsonian.
 - *Production Zone.* The majority of the Smithsonian major production systems and desktops are identified in the production zone.
 - *Scientific Zone.* The scientific zone establishes a segregated network for externally facing *scientific applications*.
 - *Public Zone.* The public zone will provide a public wireless (Wi-Fi) venue. The OCIO expects this zone to be established in 2012.
- 4) **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 social media, virtualization, Web 2.0, XML security, Digital Data Rights, etc.
 - 5) **Technical Review Boards (TRB) / Software Development Lifecycle (SDLC) Artifacts for IT Security.** The OCIO needs to ensure that IT systems developed in-house or out-sourced will support the institution's lifecycle 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.
 - 6) **Exceptions and Waivers.** For the FISMA inventory, requests for IT security exceptions and waivers to policy are reviewed and tracked by the IT Security Program.

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		02/2011

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Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Provide annual updates to Smithsonian IT Security Policies and Procedures	02/2011		02/2011
Provide annual updates to Smithsonian IT Security Policies and Procedures	02/2012	03/2012	
Provide annual updates to Smithsonian IT Security Policies and Procedures	02/2013		
Provide annual updates to Smithsonian IT Security Policies and Procedures	02/2014		
Provide annual updates to Smithsonian IT Security Policies and Procedures	02/2015		

c. Benefits

The Smithsonian ability to keep our policies and procedures updated based on the frequent releases of OMB, NIST Guidance. This approach allows the Institution to maintain a current baseline of recommended IT security practices.

d. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2006
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

10.4 Security Engineering / Technical Controls

a. Description

The Smithsonian's FISMA 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 Rev. 3 identifies 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.

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- 2) **E-authentication.** Support for a physical token in order to provide two-factor authentication for user's who are remotely accessing Smithsonian Systems. Currently Entrust Secure IDs are being deployed.
- 3) **Remote Access (VPN, CITRIX).** The Smithsonian currently provides several thousand people with remote access to the Institution's IT resources. Remote Access requirements for these individuals are reviewed annually as part of the SInet account management activities.
- 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.
- 5) **IPV6.** Most Federal Agency IT Infrastructure / networks are expected to transition from IPV4 to IPV6 over the next several years due to address space limitations and security issues. The Smithsonian IT Security Staff continues to review existing product capabilities and transition implications for firewalls, VPN, IDS, Boundary Protections / SOC Tools, etc.

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	10/2012	
Phase 3: Wireless deploy SI-wide port-level authentication	09/2006	12/2014	
Support Completion of IPV6 Transition Plan for Security Components	04/2011		04/2011
Add Portable Encryption for laptops required to support sensitive data (Team 23 Goal) (OIG Recommendation)	12/2013	09/2012	
Secure Name/Address Resolution Service (DNS-SEC) (Team 23 Goal)	09/2012		
Support two-factor authentication (password + token) for staff supporting CITRIX remote access to SInet (Team 23 Goal)	09/2012		09/2011
Add Wireless – IT Security Staff (1) FTE GS 13/14 (Team 23 Goal) <i>unfunded</i>	12/2012		

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Support two-factor authentication (password + token) for staff supporting VPN remote access to SInet (Team 23 Goal)	09/2012	09/2013	
Wireless Security Control Improvements (Team 23 Goal)	06/2013		
<i>Phase 4: Wireless vulnerability scanning and Penetration Testing</i>	09/2013		

c. Status @ a Glance

Funding Status (FY12):

Fully Funded
 Partially Funded
 Not Funded

Production Date:

2008

Enterprise Architecture:

Target Architecture
 Candidate for Replacement

Units Supported:

- SI-wide

10.5 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 commercial-off-the-shelf (COTS) and customized, along with software, hardware and appliance support for the following categories of security services:

- 1) Firewalls / Network Intrusion Detection (NIDS)
- 2) Intrusion Detection / Intrusion Prevention System (IDS / IPS)
- 3) Vulnerability Assessments / Scanners
- 4) Anti-virus / SPAM Protections and Detection
- 5) Configuration Management
- 6) Patch Management
- 7) Security Logs / Audit Trail Capture and Analysis
- 8) Incident Handling / Forensic Tools and Reporting

SOC operational controls are primarily focused on perimeter defenses and end-point security. The goal is to improve and to extend the SOC off-hour coverage. To support this goal, the SOC staff will work with the NOC staff to help train them to monitor security alerts and handle basic security services in emergency situations. A SOC Concept of

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Operations (CONOPS) should be developed in order to optimize staff, document tool reporting, and service requirements for operational security.

Operational SOC reports will be regularly provided for the OCIO's IT Security Committee. A long-range goal is to build a SOC reporting mechanism for the OCIO, the Undersecretaries and Unit IT Management Teams.

10.5.1 Information Security Awareness Training & Communications

a. Description

OCIO Directory of Computer Security 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.
 - Support email updates for threats based on phishing, etc.
 - Facilitating specialized security training reviews at various Smithsonian IT forums: IT Management Committee (ITMC), Web Masters, IT Security Committee (ITSC) Payment Card Industry Working Group, Technical Review Boards, etc..
 - Specialized training for system administrators of FISMA Major Systems; i.e. Disaster Recovery Tabletop Exercises, Incident Response Training, etc
- *Communications*
 - Communicating to staff and end-user e-mail alerts & advisories on IT Security
 - Regular updates to the PRISM IT Security Pages
 - Annual Recognition of IT Staff who have helped improved enterprise security.
 - Monthly support for security working groups: IT Security Committee (ITSC) and Payment Card Industry Working Group (PCI WG)

Measure	FY 2003 Baseline	Actual			FY 2011	FY 2012 Target
		FY 2008	FY 2009	FY 2010		
Smithsonian users who completed CSAT	62%	98%	99%	99%	99%	95%

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b. Major Milestones

Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
FY 09 Security training, FISMA reports, communications	08/2009		08/2009
FY10 Security training, FISMA reports, communications	08/2010		11/2010
FY11 Security training, FISMA reports, communications	11/2011		09/2011
FY12 Security training, FISMA reports, communications	11/2012	09/2012	

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 (FY12):

X Fully Funded
Partially Funded
Not Funded

Production Date:

2003

Enterprise Architecture:

X Target Architecture
Candidate for Replacement

Units Supported:

- SI-wide

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10.5.2 SOC Firewall / Boundary protections

a. Description

Firewalls enforce rules on connections to Smithsonian systems or services between the Smithsonian and the internet and between different zones internal to the institution's infrastructure.

In 2007 and 2008 the firewall infrastructure hardware platforms were upgraded. In 2009 public facing web sites were installed behind a web application firewall. In 2010 new firewalls were added to support the scientific zone and video conferencing. Additionally in 2010 firewalls performance was improved. Firewalls were also improved by supporting major release upgrades, increased SSL encryption strength; along with improved firewall rule sets to increase zone protections.

In 2011 the Firewall support and Security Operations Center were moved under the OCIO Network Management Division to increase operational security by using the Network Operations Center (NOC) staff for additional backup coverage for SOC supported security systems.

Web application traffic on known ports 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.

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		07/2009
Replace SE and STRI firewalls with new models	07/2009		04/2009
Perform annual FW reviews to maintain restrictions on ports, protocols and services	08/2009		09/2009
Install, configure and test FW vulnerability assessment tool.	03/2010		10/2010
Updated firewall reporting subsystem	09/2010		12/2010
Document FW compliance & exceptions	09/2011	09/2013	
Document SOC Concept of Operations	09/2012	09/2014	

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Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Increased SOC FW / NIDS staff or NMD 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 (FY12):	X Fully Funded Partially Funded Not Funded
Production Date:	2004
Enterprise Architecture:	X Target Architecture Candidate for Replacement
Units Supported:	• SI-wide

10.5.3 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 collects 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.

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Measure	FY 2003 Baseline	Actual				FY 2012 Target
		FY 2008	FY 2009	FY 2010	FY 2011	
Security incidents reported	100%	100%	100%	100%	100%	100%
Security incidents tracked	100%	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
Deploy IPS / IDS in SAO and SE environments	09/2013		

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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 (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2005
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

10.5.4 Web Protections

a. Description

The Smithsonian is making significant IT investment in order to support increased information distribution over the Web. This involves 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 have been placed behind Web Application firewalls which block common Website attacks from reaching the Smithsonian Web applications. In the mid-term a Web Application Security specialist is needed to increase support for security and privacy in SI's web design and application development.

The Smithsonian Units are increasingly hosting Web applications at third party sites. Increased reviews of security and privacy issues associated with Unit web management plans, e-authentication, web application vulnerability reviews is needed. .

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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	10/2011	
Web Security – add IT Security Staff (1) <i>FTE GS 12/13 unfunded</i>	09/2011	01/2014	

c. Status @ a Glance

Funding Status (FY12):

Fully Funded
Partially Funded
X Not Funded

Production Date:

2009

Enterprise Architecture:

X Target Architecture
Candidate for Replacement

Units Supported:

• SI-wide

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10.5.5 Vulnerability Scans

a. Description

One of the key activities of the Smithsonian 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, 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 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		07/2009
Perform scans for major systems annual assessment and accreditations and open POA&Ms for high Impact vulnerabilities not immediately fixed	09/2009		09/2009
FY11 SOC performs DMZ / System, PCI and Web Application vulnerability scans for System Sponsor remediation	09/2011		09/2011
FY12 SOC performs DMZ / System, PCI and Web Application vulnerability scans for System Sponsor Remediation.	09/2012		
Perform semi-annual checks on Infrastructure as part of the Smithsonian boundary defenses	09/2010		09/2011
Coinduct external Public Facing Scans	09/2012		

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c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2005
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

10.5.6 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 the OCIO Mail Exchange administrators 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		06/2009
Incorporate SAO windows computers into SI OCIO Exchange Anti-virus environment	09/2010	09/2012	

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c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2004
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:	•	SI-wide

10.5.7 Configuration Management (CM)

a. Description

The Smithsonian OCIO supported Configuration Management processes create Smithsonian approved baselines for preferred products based on NIST and the Center for Internet Security (CIS) approved benchmarks. Baselines are identified for:

- Operating Systems support for Windows, Unix and Linux,
- Database support for Oracle, SQL Server and MySQL
- Web support for Apache and IIS
- Application support for MS Office
- Standard Desktop / IE support for FDCC / USGCB

Server baselines are dependent on the server's function (i.e. Baseline image, Baseline with IIS, etc.). Windows baselines can be tested against the Smithsonian approved baseline standards by using an agent that allows for compliance reporting based on the Windows OS version.

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		07/2009
Begin support for major systems configuration compliance reporting as part of FISMA authorization	09/2010		09/2010

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Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Increase major system configuration management compliance reporting as part of FISMA authorization	09/2011		09/2011
Increase the availability of Slnet Server Critical configuration management compliance reports	09/2012		

c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2005
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

10.5.8 Patch Management

a. Description

The Smithsonian uses several Microsoft products for desktop and server patch management and flaw remediation. These tools provide timely support for OS updates, particularly in our Windows environment. The Office of Information Technology Operations directs this vital security function.

In 2010 Federal Desktop Core Configuration (FDCC) support for Windows XP was . In 2011 additional support was provided for the Windows 7 US Government Configuration Baseline (USGCB). Documented deviations were justified and additional work was provided to converge these baselines into a single Smithsonian standard.

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		08/2009

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Tasks / Products	Completion Date		
	Initial Projection	Current Projection	Actual
Review and apply FDCC / USGCB standards, document and justify deviations and converge implementation baseline	08/2010		12/2011
FY12 Review tool capabilities for improving Desktop Application support for Flaw Remediation	09/2013		
FY12 Review tool capabilities for improving Server support for patch management and Flaw Remediation	09/2013		
Request FY13 Capital Funds for improving Desktop and Server management of patches and flaw remediation.	09/2013		
FY14 Implement improvements in Desktop and Server management of patches and flaw remediation. (Unfunded)	09/2014		

c. Status @ a Glance

Funding Status (FY12):

X Fully Funded
Partially Funded
Not Funded

Production Date:

2009

Enterprise Architecture:

X Target Architecture
Candidate for Replacement

Units Supported:

• SI-wide

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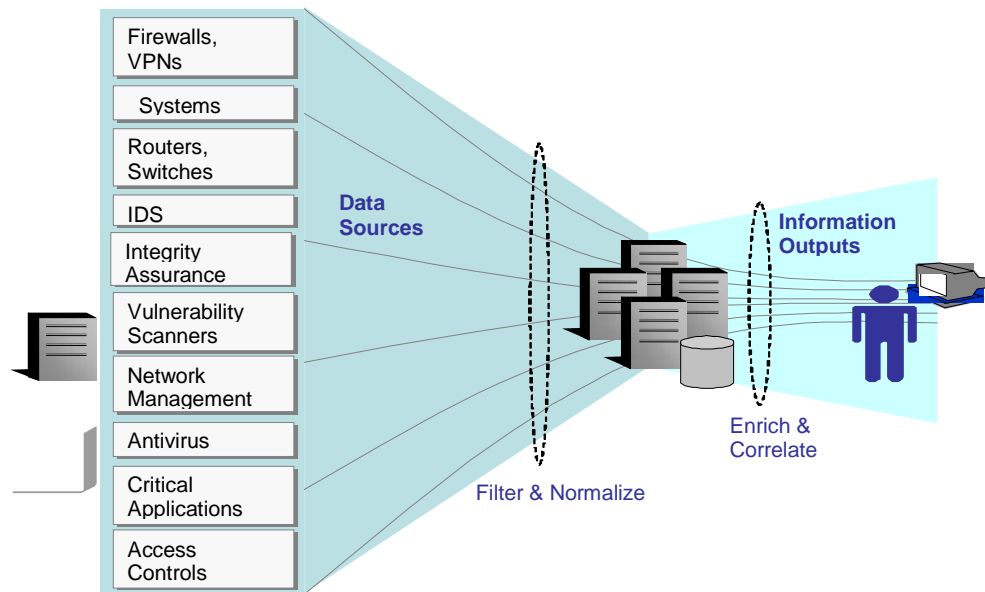
10.5.9 Security Logs / Audit Trail Capture & Analysis (Security Information Management)

a. Description

The Smithsonian's OCIO and IT computer security program has made a significant investment in IT security monitoring over the past several 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 three 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. Most recently, in FY09 and FY10 the Smithsonian has been reviewing COTS product SPLUNK as a central repository for logs.

The Smithsonian is continuing to review how to efficiently and effectively collect and manage IT security information. Currently multiple tools are being supported. In FY11 the Smithsonian completed the consolidation of log management for several major systems.



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a. 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	09/2009		06/2009
FY11 support several Major Systems central collection of critical server Logs / providing support for segregation of duties	09/2011		09/2011
FY12 Continue to Improve Reporting Capabilities <i>Unfunded</i>	09/2012		
Continue to improve Audit and Accountability by centralizing security log support (<i>SI Team 23 Goal - 3Q2013</i>)	06/2013	10/2013	

c. Status @ a Glance

Funding Status (FY12):

X Fully Funded
Partially Funded
Not Funded

Production Date:

2006

Enterprise Architecture:

X Target Architecture
Candidate for Replacement

Units Supported:

- SI-wide

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10.5.10 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:

- US-CERT meetings, announcements and alerts
- Microsoft CISCO, and Adobe, etc. Standard Product Security bulletins
- Common Vulnerability Enumeration (CVE) reports
- US-CERT Department and Agency Cybersecurity Activity Reports (DCAR)

Measures of compliance are tracked by the OCIO as part of our annual FISMA Reporting:

Measure	FY 2003 Baseline	Actual			FY 2011	FY 2012 Target
		FY 2008	FY 2009	FY 2010		
Security incidents reported	100%	100%	100%	100%	100%	100%
Security incidents tracked	100%	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.

b. Milestones

Tasks	Completion Date		
	Initial Projection	Current Projection	Actual
FY09 Incident Handling, US-CERT & FISMA reporting	09/2009		09/2009
FY10 Incident Handling, US-CERT & FISMA reporting	09/2010		09/2010
FY11 Incident Handling, US-CERT & FISMA reporting	09/2011		09/2011
FY12 Incident Handling, US-CERT & FISMA reporting	09/2012		

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c. Status @ a Glance

Funding Status (FY12):	X	Fully Funded Partially Funded Not Funded
Production Date:		2009
Enterprise Architecture:	X	Target Architecture Candidate for Replacement
Units Supported:		• SI-wide

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10.6 FISMA Assessments and Authorizations

a. Description

The Smithsonian voluntarily supports OMB A-130 guidance on policy for the management of Federal information resources. This section provides the overarching guidance for Federal IT Security Requirements and is the basis of the Smithsonian's FISMA inventory of its major systems.

The amount of Sensitive but Unclassified Information (SBU) at the Institution (as an .edu) is small compared to most federal / executive agencies.

FISMA assessment and authorizations are based on Federal Information Processing Standards (FIPS) for:

- **FIPS 199**, *Standards for Security Categorization of Federal Information and Information Systems*, February 2004.
- **FIPS 200**, *Minimum Security Requirements for Federal Information and Information Systems*, March 2006.

The major systems in the Smithsonian's FISMA inventory are identified in the table below. For these systems, assessments and authorization are used to ensure NIST SP 800-53 security controls are selected, implemented and operating effectively; and that system sponsors understand any vulnerabilities or internal control weaknesses that add potential risks to their systems and mission.

Smithsonian Institution's FISMA Inventory – Major Systems

Major Systems Identified by the Office of the Undersecretaries	System Categorization (based on FIPS 199)
OUSHAC - Richard Kurin	
ARTCIS	Low
NMAH CIS	Low
NMAI CIS	Low
OEA - Virginia Clark	
DMIS	Moderate
OUSFA - Albert Horvath	
OCIO Managed IT Infrastructure - Slnet	Moderate
OCFO ERP FINANCIALS	Moderate
OCIO ERP WebTA	Moderate

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OHR ERP HRMS	Moderate
OHR STAR MGS (Outsourced)	Moderate
OCIO SIRIS	Low
OFEO FMS	Moderate
OFEO OPS-SMS_IDMS	Moderate
OFEO BAS	Moderate
OUSS - Eva J. Pell	
OF SOLAA	Moderate
NMNH RCIS	Low
SAO SCI	Moderate
SAO HEA	Moderate

As resources allow, the OCIO IT Security Staff works with the IT system sponsors to support FISMA reviews in the following areas:

- 1) **System Security Plans and Risk Assessments.** All major System Security Plans (SSP) are required to be updated annually to include any new requirements and implementation based on NIST 800-53 Controls identified in the TSG-930-02 Security Control Manual. An on-going SSP goal for all major system security plans is to improve the descriptions of control design and implementations. Risk Assessments (RAs) are required to be updated for an authorization.
- 2) **Contingency / Disaster Recovery Plans and Tests.** An on-going goal is to improve Contingency Plans (CP) Testing. Historically all major systems have been required to complete a table-top exercise of their Disaster Recovery Plan (DRP). Moderate impact systems are required to test a contingency plan if they are not already included in the annual ERP Disaster Recovery Plan Test.
- 3) **System Test & Evaluations and Security Assessment Reports.** An on-going goal is to improve security control testing based on NIST 800-53A, particularly for the major systems and newly associated applications being reviewed by the Technical Review Board (TRB).
- 4) **Assessment & Authorizations.** An on-going goal is to provide sponsors with an assessment of risks and recommendations to reduce system vulnerabilities and internal control weaknesses.
- 5) **Quarterly Monitoring.** An on-going goal is to provide quarterly vulnerability reports for major systems and review progress on remediating critical/ high impact vulnerabilities or any significant control weaknesses identified in the system's POAMs.

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Measure	FY 2003 Baseline	Actual			FY 2011	FY 2012 Target
		FY 2008	FY 2009	FY 2010		
<i>Major IT systems...</i>						
... with an annually updated System Security Plan (SSP)	91.7%	100%	100%	100%	100%	100%
... with Risk Assessments (RA) updated as part of the Authorization	n/a	Not measured	100%	100%	100%	100%
...with an annually updated Contingency Plan (CP) / Disaster Recovery Plan (DRP)	8%	100%	100%	100%	100%	80%
... with an annually tested or exercised a CP/DRP	8%	100%	100%	100%	100%	80%
... that receive and annual assessment or authorization	0%	100%	100%	100%	100%	100%
...that review vulnerability scans and POAMs annually	not measured	not measured				100%

b. Major Milestones

Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Complete FY08 FISMA packages	08/2008		08/2008
Improve System POA&M reporting	12/2008		12/2008
Improve SAR and e-authentication artifacts	08/2009		08/2009
Complete FY09 FISMA packages	08/2009		08/2009
Improve SSP Requirements templates	12/2009		09/2010
Improve CP/DRP Plans and tests to increase integration with COOP. (Team 23 Goal 4Q09)	04/2010		09/2010
Complete FY10 FISMA Packages	08/2010		09/2010
Develop Continuous Monitoring Plan	06/2011	CIO Waiver	
SInet Systems – add IT Security Staff (1) FTE GS12/13 (Team 23 Goal)	09/2012		10/2010
Complete FY11 FISMA Packages + Develop (2) additional system packages	08/2011		09/2011
Complete FY12 FISMA packages	09/2012		
Complete FY13 FISMA packages	09/2013		

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Tasks/Products	Completion Date		
	Initial Projection	Current Projection	Actual
Improved FY12 System Continuous Monitoring & Reporting	09/2012		
Improved FY14 System Continuous Monitoring & Reporting	06/2014		

c. Benefits

IT compliance monitoring and authorizations provides increased assurances that the NIST 800-53 security controls are in place and are operating effectively. It also monitors and tracks 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 (FY12):

X Fully Funded
Partially Funded
Not Funded

Production Date:

2009

Enterprise Architecture:

X Target Architecture
Candidate for Replacement

Units Supported:

Major systems in FISMA Inventory

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APPENDIX

APPENDIX: ACRONYMS

AAA	Archives of American Art
ACM	Anacostia Community Museum
APAP	Asian Pacific American Program
ASE	Assistant Secretary for Education
CFCH	Center for Folklife & Cultural Heritage
CHNDM	Cooper-Hewitt, National Design Museum
DUSCIS	Deputy Under Secretary for Collections & Interdisciplinary Support
FSGA	Freer/Sackler Galleries of Art (Combined Organizational Unit)
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
OA	Office of Advancement
OC	Office of the Comptroller
OCEA	Office of Communications and External Affairs
OCFO	Office of the Chief Financial Officer
OCIO	Office of the Chief Information Officer
OCon	Office of Contracting
OEC	Office of Exhibits Central
OFEO	Office of Facilities Engineering and Operations
OFI	Office of Fellowships and Interns
OFMR	Office of Facilities Management & Reliability
OGC	Office of the General Counsel
OGR	Office of Government Relations
OHR	Office of Human Resources
OIG	Office of The Inspector General
OP&A	Office of Policy and Analysis
OPMB	Office of Planning, Management & Budget
OPS	Office of Protection Services

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OS	Office of The Secretary
OSHEM	Office of Safety, Health and Environmental Management
OSM	Office of Systems Modernization (OCIO)
OSP	Office of Sponsored Projects
OT	Office of the Treasurer
OUSHAC	Office of the Under Secretary for History, Art, and Culture
OUSS	Office of the Under Secretary for Science
OVS	Office of Visitor Services
SA	Smithsonian Affiliations
SAAM	Smithsonian American Art Museum
SAO	Smithsonian Astrophysical Observatory
SCEMS	Smithsonian Center for Education and Museum Studies
SE	Smithsonian Enterprises (formerly Smithsonian Business Ventures)
SERC	Smithsonian Environmental Research Center
SI	The Smithsonian Institution
SIA	Smithsonian Institution Archives
SIL	Smithsonian Institution Libraries
SITES	Smithsonian Institution Traveling Exhibition Service
SLC	Smithsonian Latino Center
TSA	The Smithsonian Associates
USS	Under Secretary for Science