

3D Digital Preservation in the Intermountain Region of the National Park Service
**Research and Recommendations for
3D Digital Documentation Program Implementation**



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REQUESTING REVIEW

BY THE D3 DIGITAL DOCUMENTATION PROJECT WORKING GROUP

NATIONAL PARK SERVICE INTERMOUNTAIN REGION



As part of the collaboration -- for those who have been involved with this project -- we extend the opportunity for final comments prior to printing copies of the document in August.

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INTRODUCTION

3D DIGITAL DOCUMENTATION PROJECT MEMBERS OF THE WORKING GROUP

The Intermountain Region Office of the National Park Service formed a “Working Group” as a coordinating and review body for this project.

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3D DIGITAL DOCUMENTATION

CONTEXT: BACKGROUND ON 3D DIGITAL DOCUMENTATION

DIGITAL DOCUMENTATION CONTEXT & BACKGROUND

What is digital documentation? For the purpose of this document, digital documentation is the practice of recording the existence of a particular feature, landscape, building, and historic resource or landmark using digital technology. This use of digital technology supports protection of our historic resources by recording, documenting, managing and sharing data in digital forms. The various digital data capture forms are aerial and terrestrial photogrammetry and aerial and terrestrial 3D laser scanning (LiDAR). Practitioners use these data capture tools to create an accurate digital archive of data resources.

Why is it used? Digital documentation is an important tool commonly employed in architecture, engineering, oil and gas, forensic investigation and civil infrastructure. In preservation, however, practitioners use digital documentation in the recording, documentation, resource management and interpretation of cultural resources and heritage information. Digital documentation is highly accurate and less time consuming compared to traditional survey methods. Use of the various tools is especially important in safely documenting inaccessible or fragile resources; they are thus digitally preserved. There are two objectives for the use of digital data collection: Resource Management and Interpretation.

- **Resource Management** (also known as Cultural Resource Management): As steward of many of America's most important natural and cultural resources, the National Park Service is responsible for preserving them for the enjoyment of present and future generations. Therefore, as an act to manage the nation's resources, the NPS employs resource management through Research, Planning, and Stewardship. Research identifies, evaluates, documents, registers and establishes information about the cultural resources; Planning ensures that management practices integrate this information to make future decisions and set priorities; and Stewardship is the commitment to act on planning decisions so that resources are preserved, protected, and interpreted for the public.
- **Interpretation:** Within the National Park Service, the goal of all interpretive services is to increase each visitor's enjoyment and understanding of the parks, and to allow visitors to find an opportunity to connect personally with the place. Interpretation of a park using 3D digital documentation is achieved in many different ways; one example is the creation of a web database displaying the 3D data collected and the deliverables created.
- **How long has it been available?** According to the Getty Conservation Institute, the practice of photogrammetry for survey use dates back to the late 1930s through the 1950s; the technology continued to develop to its present use. Since the early 1980s,

the Bureau of Land Management's (BLM) national operations center in Denver, CO, uses photogrammetric techniques for resource documentation. The efforts by NASA beginning in the 1970s were key proponents in the use of laser scanning and development of the use in other industries. In 1993, Ben and Barbara Kacyra created Cyra Technologies as the first commercially available integrated system of high-resolution 3D laser scanning and point cloud software for the use of architecture, engineering, construction, and media industries. CyArk began using the LiDAR scanning technology in preservation and heritage management in 2003.

GLOSSARY OF TERMS

SPECIFIC TO THE COOPERATIVE ECOSYSTEM STUDIES UNITS (CESU) BETWEEN THE NATIONAL PARK SERVICE AND THE COOPERATIVE AGREEMENT WITH UC DENVER

Cooperator: refers to associate or organization that jointly enters a mutually beneficial agreement with another associate or organization. Often times the cooperator enters the agreement with a federal agency and state, local, or tribal government, such as the National Park Service. The Center of Preservation Research is an example of a Cooperator working within the structure of a Cooperative Agreement.

Cooperative Agreement: is a financial assistance mechanism and legal instrument used to establish a relationship between a federal agency and state, local, or tribal government or other recipient. A cooperative agreement requires substantial involvement between the two parties. A grant differs from a cooperative agreement in that a grant does not require substantial involvement by the grantor, such as the Federal Government or agency. The “principal purpose” of a cooperative agreement must be legitimate and not simply a means of non-competitively acquiring property or services for the direct benefit or use of the Federal Government.

Interpretation: Within the National Park Service, the two goals of all interpretive services is to 1) increase each visitor's enjoyment and understanding of the parks, and to allow visitors to find an opportunity to connect personally with the place, 2) conservation and protection which is served by an interpretive program. One example of park interpretation is the creation of a web database displaying the 3D data collected and the deliverables created.

Resource Management (also known as Cultural Resource Management): As steward of many of America's most important natural and cultural resources, the National Park Service is responsible for preserving them for the enjoyment of present and future generations. Therefore, as an act to manage the nation's resources, the NPS employs resource management through Research, Planning, and Stewardship. Research identifies, evaluates, documents, registers, and establishes other basic information about the cultural resources; Planning ensures that management processes integrate this information to make future decisions and set priorities; and Stewardship involves the commitment to carry out planning decisions so that resources are preserved, protected, and interpreted to the public.

SPECIFIC TO 3D DIGITAL DOCUMENTATION TECHNOLOGY AND DATA

Data Archiving: is the process of moving and storing data on a separate data storage device for short and/or long-term retention. Generally, data that is archived is older and may no longer be actively used, however it is still important and necessary data that needs to be stored for future reference, or retained for regulatory compliance. Data archiving is different from data backup, in that data backup is used to restore data in case of corruption, but does not take into account storing the data for long-term purposes.

Data Format: refers to the way the data is put together. The data format is usually defined by the three-letter filename extension placed at the end of the filename, after the period. Data formats affect the ways in which data can be viewed or opened. In digital documentation there are various data formats in which one could store their 3D data, however some of these formats require special programs to open or use the data. Some formats, such as ASCII or .txt files are able to bridge technologies and serve multiple purposes.

Data Management: As provided by the definition from the Data Management Body of Knowledge (DAMA), “data management is the development, execution and supervision of plans, policies, programs and practices that control, protect, deliver and enhance the value of data and information assets.”

Database: Refers to an organized collection of data. A database is usually created as a repository of organized data to serve relevant needs for particular processes or programs.

Digital Documentation (DD): For the purpose of this document, digital documentation is the practice of recording the existence of a particular feature, landscape, building, and historic resource or landmark. This use of digital technology supports protection of our historic resources by recording, documenting, managing and sharing data in digital forms. The various digital data capture forms are aerial and terrestrial photogrammetry and aerial and terrestrial 3D laser scanning (LiDAR). Practitioners use these data capture tools to create an accurate digital archive of data resource.

High Definition Surveying (HDS): HDS is a term used most often when referring to LiDAR 3D laser scanning when using the Leica Geosystems brand name equipment. Leica defines most of their laser scanning equipment as HDS scanners, unlike some other manufactures, even though the scanners may do the same thing.

Light Detection and Ranging, or Light, Imaging, Detection and Ranging (LiDAR): Similar to radar, LiDAR uses laser pulses rather than radio waves. Technicians use both LiDAR and radar to determine distances by measuring the time delay between transmission and reflection of the pulse. LiDAR technology can provide three-dimensional laser scans of high definition for several purposes, such as architectural as-built survey, engineering survey, geographic survey, cultural resource survey and management, etc. The laser scans created from LiDAR techniques consist of three-dimensional point clouds, and each point within the cloud is assigned an XYZ coordinate, allowing for very accurate 3D mapping.

Aerial LiDAR: The LiDAR laser scanner unit, attached to an aircraft, accurately measures and collects terrain information. This process scans the earth's surface at very high rates and generally defines the ground, vegetation, and man-made structures. This technology can be very useful with the National Parks to monitor and/or document Natural Resources.

Terrestrial LiDAR: The LiDAR laser scanner unit, mounted on a tripod, collects data from the ground/earth's surface. Terrestrial LiDAR collects higher-precision data (millimeter accuracy) compared to Aerial LiDAR. Therefore, practitioners often use Terrestrial LiDAR to document subjects that have more detail and require denser data than what Aerial LiDAR can collect. Within the Parks, Terrestrial LiDAR is usually used to document Cultural (mostly man-made) Resources rather than Natural Resources.

Photogrammetry: This term refers to the science of making reliable measurements by the use of photographs, and especially aerial photographs (as in surveying). Regarding digital documentation, Photogrammetry is more specifically the process of converting or mapping the flat 2-dimensional images, taken through traditional photography, and bringing them back into the real 3-dimensional world through a process of triangulation. Triangulation is the principle used to produce 3D point measurements, by mathematically intersecting converging lines in space. We are concerned with two types of Photogrammetry:

Aerial Photogrammetry: The camera, mounted to an aircraft, takes multiple overlapping photos of the ground. By processing the photos in a stereo-plotter, the operator is able to see two photos at once in stereo view. This type of photogrammetry is usually topographic in nature, thus obtaining data to map the topography of the specified land.

Close-Range Photogrammetry: The camera is close to the subject, usually hand-held or on a tripod. This type of photogrammetry is not topographic and instead aims to acquire data to create drawings, 3D models, measurements, or point clouds. Practitioners sometimes refer to close-range photogrammetry as "Image-Based Modeling."

Point Cloud: A collection of XYZ coordinates in a common coordinate system that portrays to the viewer an understanding of the spatial distribution of a subject. Generally, the viewer can see the point cloud either as an intensity value or in true RGB value. Point clouds are generated using both LiDAR and Photogrammetry technologies.

Point Density: Refers to the average distance between the individual XYZ coordinates (or points) in a point cloud. The density of a point cloud is determined by the amount of coverage captured on-site during data capture and the settings of the scanner when using LiDAR technology. A point cloud's density can range from several centimeters (low density) to sub-millimeter (high density).

Reflectance Transformation Imaging (RTI): Reflectance Transformation Imaging: (also known as RTI) is a computational photographic method that is able to capture a subject's surface, shape and color. The RTI process requires information derived from multiple digital photographs of a subject shot from a stationary camera position; for each photograph, light is projected from different known directions. Thus, this process generates a series of images, of the same subject, with varying highlights and shadows. This lighting information from the images is mathematically synthesized to generate a mathematical model of the surface, and interactively examine its surface on a computer.

Triangulated Irregular Network Model (TIN Model): A digital data structure used to represent a surface. It is a vector-based representation of the physical land surface made of irregularly distributed nodes and lines with three-dimensional coordinates, arranged in a network of non-overlapping triangles. TIN models are usually associated with 3D data and topography models.

SECTION ONE: EXECUTIVE SUMMARY

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A. Project Background

Project Purpose and Desired Outcomes

The purpose of the Cooperative Agreement between the University of Colorado Denver and the National Park Service (NPS) was two-fold:

1. to develop best practices for digital documentation, and
2. to develop recommendations for the development of a 3D digital documentation program within the Intermountain Region of the NPS.

Background

In August 2012, the Intermountain Region (IMR) of the NPS provided UC Denver’s Center of Preservation Research (CoPR), with the following background and overview.

“Throughout the architectural, engineering and survey industries, several new digital imaging technologies have emerged to produce precise 3D point clouds and 3D models of a diversity of resources ranging from expansive oil refineries to entire interstate highways. These “reality capture” technologies include aerial, terrestrial, and mobile LiDAR (3D Laser Scanning), digital photogrammetry and reflectance transformation imaging (RTI). These imaging technologies have become ubiquitous today in the commercial architectural, engineering, and construction market and are able to capture tens-of-thousands to hundreds-of-thousands of data points per second to accuracies within microns or centimeters. The detail, accuracy, and completeness of the data collected represent a quantum leap over traditional survey methods.

However, aside from a few governmental entities such as the Federal Highway Administration and Smithsonian Institute, the federal government and, specifically, the National Park Service (NPS) have been slow to adopt these new technologies. Nonetheless, over the past five years, numerous NPS units have undertaken digital documentation projects within the Intermountain (IMR) and Pacific West (PWR) regions. The IMR estimates that at least 25 parks have completed some form of digital documentation. Unfortunately, no NPS guidelines or Best Practices currently exist to help parks choose the most appropriate technology, develop cost effective and up-to-date scopes-of-work, disseminate the information to a broader audience, and to archive the digital data in a readily retrievable format. In the same way, NPS partners – such as State Historic Preservation Offices, statewide preservation organizations, other federal agencies, and academic partners – are also seeking guidance on Best Practices for digital documentation.”

B. Method and Overall Process

In keeping with the intent of a Cooperative Agreement, the IMR office formed a “Working Group” as a coordinating and review body. The Director of CoPR represented the Cooperator team’s research and activities as a member of this Working Group. (Please see Introduction, pages i-ii, for a list of Working Group members.)

With input and in collaboration with the Working Group, CoPR engaged in two areas of research:

- 1) *Research Internal to the NPS-IMR* to determine the status of existing and past digital preservation projects, to identify issues and to assess technical needs in terms of conducting digital surveys and managing the digital data.
- 2) *Research of External Organizations* to establish “best practices.”

Internal to the NPS-IMR: Determine the status of existing and past digital preservation projects, identify issues, and assess technical needs in terms of conducting digital surveys and managing the digital data.

The original NPS-CoPR Agreement tasked the Cooperator, CoPR, in collaboration with NPS and Western National Parks Association (WNPA), to conduct in-person interviews with “representative park resource and interpretive staffs as well as regional staff.” The purpose of the interviews was “to determine the status of existing digital projects within IMR and to ascertain the needs of parks and programs (Natural and Cultural Resources, Interpretation, etc. The Working Group thought a solid database of 3D digital documentation (DD) projects in the Intermountain Region was required to identify appropriate individuals to participate in interviews or to develop useful questions. The Working Group then determined that a questionnaire would be the most suitable vehicle to establish an inventory and to collect other information regarding experiences with digital documentation.

CoPR developed the initial questionnaire with input and review from the Working Group. The overall purpose of the questionnaire was to determine the status of existing and past digital preservation projects, identify issues, and assess technical needs in terms of conducting digital surveys and managing the digital data. The questionnaire structure allowed participants to provide experiential information and report DD activity within an inventory section. The NPS Working Group first distributed the questionnaire to the Vanishing Treasures (VT) office as a “focus group.” These early participants also provided feedback about the actual questionnaire.

The CoPR team then made revisions in the document. After reviews and suggestions from the NPS Working Group, the IMR office distributed the questionnaire to the Superintendents of every Park in the Rocky Mountain Region, 91 in total.

Desired Outcomes regarding Research of External Organizations: Establish “best practices.”

Concurrent to the activity internal to the IMR, members of the CoPR team researched and gathered information from external organizations engaged in various aspect of digital documentation. One objective of this investigation was to discover examples of guidelines, standards, formats, technologies and practices, and methods for managing data and sharing information.

CoPR’s data-gathering effort with external organizations concluded that there was not a repository of “best practices” in digital documentation found in one organization. The emphasis shifted to describing best resources for the NPS-IMR in establishing their digital documentation program from various resources. CoPR framed this research in a case studies format, highlighting potentially useful information and resources available through various organizations.

C. Overview of Document Organization

Several defining moments during the investigative process shape the organization of this summary report.

- There was a need to establish an inventory of DD projects within the NPS-IMR.
- NPS questionnaire respondents provided valuable feedback that led to Cooperator’s recommendations.
- The Cooperator found that the activities and focus of various preservation and heritage organizations produced some excellent examples and resources.

The CoPR team (aka “the Cooperator”) has therefore organized this document to present recommendations based on analysis of NPS responses and presentation of case studies from external organizations. Additionally, we decided to provide a context for the project with some background on 3D Digital Documentation.

- The **Introduction** provides a table of contents, information regarding the project working group, a context for use of 3D Digital Documentation, and a glossary of terms.
- We begin **Section I** with an executive summary of the project background, research methods and process, and an overview of the way we chose to organize the report.
- **Section II** includes an executive summary of findings from the questionnaires and surveys administered to the Vanishing Treasures office and to the NPS-IMR. CoPR then summarizes the results of our research into the activities of specific external organizations dealing with heritage, as well as providers of 3D Digital Documentation services. We present each of these as a separate case study highlighting what could be of value. Within the case study

section, we have placed a spreadsheet that includes all organizations studied and summarizing the highlights.

- In **Section III: Summary and Recommendations**, CoPR provides an analysis and summary of research with conclusions and implications. Here we integrate questionnaire findings and case study highlights. Section III ends with recommendations for an NPS-IMR Digital Documentation Program.
- **Section IV** contains a collection of resources, such as templates and guidelines.
- The report concludes with the **Appendices**.

D. Recommendations

CoPR's recommendations take into account the needs and challenges identified by IMR staff and lessons learned through the research process internally and externally. For implementation of a successful Digital Documentation Program, we encourage the NPS-IMR to consider actions in the following categories:

STRATEGY AND GOALS WITHIN NPS-IMR

- Develop a strategic vision with rationale and shared understanding for using 3D digital documentation.
- Establish clear goals with adequate resources.
- Consider the value of digital documentation expertise in hiring decisions, in determining workloads, promoting staff and creating incentives.

INTERNAL STRUCTURES AND MECHANISMS RE: INFORMATION, COORDINATION, COMMUNICATION AND TRAINING

- Develop organizational structures and mechanisms to regularly and systematically capture and maintain an inventory of 3D digital documentation activities. For example, options might include these among others:
 - Create a central database and a searchable central archive.
 - Consider staffing and systems to maintain a central database.
- Establish vehicles for *internal* communication, colleague to colleague.
- Establish vehicles for cross training and project-sharing.
- Establish educational and informational vehicles in support of external communication, cross-training and project sharing *outside* NPS-IMR.
- Create training programs; establish easy access to available training and up-to-date resources.
- Create and offer cross-discipline training for NPS staff to include management, documentation professionals, contracting administrators, etc. Consider inviting representatives of contract groups, partners and cooperators.

- Current interactive technology and communications technology makes it possible to share information and gather knowledge in “real-time.” That said, we recognize the need for guidelines, guidebooks and manuals to provide a framework and to ensure consistency. Because technology and practice is changing so rapidly, one criterion of manual development should be adaptability.

MANAGEMENT PRACTICES; DECISION-MAKING AND RESOURCE ALLOCATION

- Develop criteria and guidelines for 3D digital documentation project selection and resource allocation.
- Implement standardized processes for 3D digital documentation data collection, storage, management, and sharing.
- Establish a collaborative group of professionals within the NPS-IMR to develop and manage standards and guidelines.
- Determine cost-effective strategies for acquiring and utilizing equipment and technologies.

CONTRACTING

Issues with contracting span across all of the previous categories. Many responders mentioned challenges and needs in this particular arena.

- Consider involving contractors in development of criteria and guidelines for 3D digital documentation project selection and resource allocation.
- Once criteria and guidelines are established, meet with current and potential contractors to discuss agreed-upon expectations, roles and practices.
- Consider workshops with current and potential contractor and digital documentation practitioners within the NPS-IMR. The purpose of these workshops is to educate one another on need, challenges, limitations and best practices.
- Review NPS templates for contracting; ask for resources and/or guidance on creating templates for 3D Digital Documentation contracts. Encourage education of NPS contracting staff.
- Review best practices guidelines for contracting, including other fields of practice. (See Section Four: “Resources” for examples.)

SECTION TWO: PROCESS AND FINDINGS

SECTION TWO: PROCESS AND FINDINGS

The Center of Preservation Research (CoPR) worked concurrently on gathering data internal to the NPS while researching digital documentation practices of organizations external to the NPS. During this phase, CoPR communicated with the NPS Working Group regularly, seeking input and collaborative review.

A. NPS Questionnaire and Inventory

There were three main research components internal to NPS-IMR:

1. Administer questionnaire and inventory
2. Summarize and analyze responses
3. Identify key issues

The NPS-IMR Working Group determined that a questionnaire would be the most suitable vehicle to collect information regarding staff experiences with digital documentation and to establish an inventory of projects within the region.

CoPR developed the initial questionnaire with input and review from the Working Group. The overall purpose of the questionnaire was to determine

- staff experience and training;
- advantages of using 3D digital documentation;
- challenges and needs in conducting digital documentation;
- challenges and needs in managing the data; and
- status of current and previously completed digital documentation projects.

The questionnaire structure allowed participants to provide experiential information and report DD activity within an inventory section.

During November – December 2012, the IMR office distributed the questionnaire to the Vanishing Treasures (VT) office as a “focus group.” This initial questionnaire and survey included a short section for VT participants to provide feedback about the instrument itself. Of the nine questionnaires distributed, we received seven responses.

VT QUESTIONNAIRE SUMMARY

Because of the small number of participants involved in the first round of questionnaire administration, we did not weigh those responses in order of importance or significance. Based on seven responses from the Vanishing Treasures group, we summarized the following information:

BENEFITS OF DIGITAL DOCUMENTATION

- Less time consuming
- High levels of accuracy & detail

- Quality of data
- Less Impact on resource
- Condition monitoring
- Detailed inventories

CHALLENGES WITH DIGITAL DOCUMENTATION

- Data management
- Data size
- Archiving & storage
- Expense of software & equipment
- Communication
- Lack of coordination & standardization

IMR QUESTIONNAIRE SUMMARY

The CoPR team made revisions in the questionnaire document based on VT responses and feedback. After reviews and suggestions from the NPS Working Group, the IMR office distributed the questionnaire to every Park in the Intermountain Region, 91 in total, through contact with the Park Superintendents. This process took place during February and March 2013. CoPR received 29 completed questionnaires, a 36% turnout.

IMR Questionnaire Summary (29 responses)			
BENEFITS OF DIGITAL DOCUMENTATION	Per cent of total responses	CHALLENGES OF DIGITAL DOCUMENTATION	Per cent of total responses
Outcomes with high levels of accuracy and detail	82%	Size of files/data size	77%
Ability to view and analyze data off-site	77%	Data management	73%
Can be used for resources management and interpretation.	77%	Long term archiving of data	73%
Less physical impact on site	73%	Few staff well-versed in technology	64%
Ability to more effectively document fragile resources	73%	Cost and accessibility of software and equipment	59%
Variety of use for data/products	73%	Expense/cost of contractor	55%
Allows for condition monitoring	55%	Training would be required or would require specialized personnel	50%
New way of looking at things	55%	Difficult to use contractor's data and/or need for someone to process and interpret data	41%
Technology makes it easier to document less accessible sites	50%	Short term storage and accessibility of data	27%
Allow for detailed inventories	45%	Lack of coordination and standardization	27%
Less time consuming	12%	Communication, e.g., awareness of other NPS projects.	18%

INVENTORY SUMMARY: VT and IMR

Because we were able to keep a similar format for the inventory section in both the Vanishing Treasures and IMR parks instruments, we are able to summarize the data altogether. The following information reflects projects identified in both inventories. Participants were asked to include all of the projects they have conducted; some only listed one where others listed several. This collection identified the challenge of how projects are defined and calculated among parks. As a result the numbers of projects was high and may need to be reevaluated with specific instructions in identifying projects.

- Of the **364** total projects identified, only **54** exist in the current NPS-IMR inventory.
- The types of projects fell into these three main categories:
 - structures (32)
 - landscapes and/or sites (29)
 - ruins and/or features (14)

DATA COLLECTION

In the section regarding data collection, we learned that the Parks used a variety of vehicles for collection as reflected here:

- Cooperator (7 projects)
- Contractor (14 projects)
- NPS; outside park (21 projects)
- Other (30 projects)

DATA FORMAT AND FILE SIZE

From the inventory responses regarding format of data collected and stored, we discovered that most of this information is unknown or unavailable. The same was true of file size of data collected and stored.

- Format of data collected: 40 unknown
- File size of data collected: 36 unknown
- Format of data stored/archived: 26 unknown
- File size of data stored: 35 unknown

B. Case Studies of External Organizations

There were four main research components external to NPS-IMR:

1. Research organizations involved in digital documentation.
2. Develop case studies and standards of success.
3. Highlight strengths of each organization in the field of 3D digital documentation and the organization's structure and management.
4. Identify available resources relevant to recommendations.

PURPOSE

The case studies research was part of a larger comprehensive study into digital documentation and best practices. CoPR's initial exploration of organizations outside of the National Park Service focused on best practices in the areas of site assessment, data gathering, data management, technology methods, archiving, existing standards and guidelines, and digital documentation projects. On a separate but related track, CoPR was also involved within the National Park Service's Intermountain Region to determine the current status of their digital documentation practices. After analyzing responses to the internal questionnaires and surveys, CoPR broadened its research of external organizations to identify resources that might address needs and challenges within the IMR. The case studies include 1) an analysis on the few existing digital documentation programs, 2) practices of conservation organizations, 3) guidelines and standards developed for digital documentation, 4) training and data management strategies, and 5) opportunities for bringing these resources to an accessible and collaborative 3D digital documentation program. Within each case study, we explore available programs and resources, documents and supporting material, training and education strategies, organizational structure and management, and accessibility and use of websites.

CoPR selected the following organizations as case studies relevant to development of the NPS IMR 3D Digital Documentation Program:

Digital Documentation Organizations

- CyArk
- US Institute of Building Documentation (USIBD)

Heritage Management Organizations

- English Heritage
- The Smithsonian
- The Getty Conservation Institute

Data Services

- Archeology Data Service (ADS) and Digital Antiquity
- Federal Agencies Digitization Guidelines Initiative (FADGI)

Training Services

- National Center for Preservation Technology and Training (NCPTT)

DIGITAL DOCUMENTATION ORGANIZATIONS

CYARK

CyArk is a 501c3 non-profit organization with the purpose of preserving cultural heritage sites through digital technologies. The various hazards and threats facing our cultural heritage continue to grow and have encouraged CyArk in the collection, preservation and dissemination of cultural heritage data. As a digital documentation program, CyArk utilizes laser scanning, digital modeling and other technologies to collect and preserve data. The organization shares data collected in educational practices and cultural tourism. By providing interpretive digital media to visitors and community members, they are able to extend education to the public regarding the human impact on heritage sites. This awareness will further promote the importance of history and cultural preservation through responsible tourism. CyArk offers professionals tools, education and resources to document sites physically through digital preservation. CyArk educates preservation professionals in new documentation technologies with training opportunities, the production of reliable and accurate documentation of cultural heritage sites and accessibility of projects for future research and use.

RESOURCE HIGHLIGHTS: CYARK

- *Standardized Process*
 - Total Process for Digital Preservation
- *Education & Training*
 - Lesson Plans
 - Education News (Articles and Presentations)
 - Teacher Advisory Committee Opportunity
- *Projects & Standards*
 - The CyArk 500 Challenge
 - The CyArk 500 Project Standards and Procedures (Best Practices)
- *Website*
 - Accessibility
 - Public and Professional Resources

A. STANDARDIZED PROCESS

- *Total Process for Digital Preservation*

CyArk created a four-step process used for all projects within CyArk and by its partners worldwide.

1. Site Selection

Since many factors play into site selection, it is important to identify individual site needs and their significance to human culture.

2. Collection

CyArk uses a variety of methods to collect information and thoroughly document a site, including traditional survey techniques, new photographic strategies and 3D laser scanning.

3. Creation

The collection methods allow for the creation of several deliverables:

- CAD Drawings
- High Dynamic Range Photographs
- Accurate 3D Point Clouds
- Multimedia (for educational and cultural tourism)

4. Dissemination

CyArk's archives provide secure storage and accessibility by site managers and the public. (*Available on the Heritage Sites section of CyArk's website*)

B. PROJECTS & STANDARDS

- *The CyArk 500 Challenge; Project Standards and Procedures*

The Challenge: A primary goal of CyArk is to preserve as many significant world heritage sites as possible. The CyArk 500 Challenge includes digitally preserving 500 of the most important world heritage sites over a five-year period. CyArk established this particular number of projects by estimating how many sites they could document successfully within five years.

Project Standards and Procedures: As a guide of best practices for digital preservation projects, CyArk created the document, "Project Standards and Procedures," to be a living guide which evolves with the changing technologies and practices. It guides fieldwork and projects intended as submissions for the CyArk Archive. The manual outlines documentation methods of laser scanning, digital photography and surveying in addition to planning and site execution.

Document Outline:

- Introduction
- Data Capture Standards and Procedures
 - Documentation Planning
 - Survey
 - High Definition Survey (terrestrial 3D laser scanning)
 - Photography
 - Capturing Panoramic and Composite Images
 - Metadata
- References

C. TRAINING & EDUCATION

- *Lesson Plans*

CyArk offers educators the opportunity to join the free CyArk Professional Account, which provides lesson plans, hands-on and computer based activities for K-12.

- *Education News*

The education news section of the CyArk website includes links, articles and presentations with new ideas in classroom settings and professional development.

- *Teacher Advisory Committee*

CyArk formed this committee for teachers to review CyArk's education program and to explore ways to integrate CyArk's media and opportunities into the classroom environment. This collaborative effort will provide teachers with published lesson plans; teacher involved also receive credit.

D. WEBSITE - <http://archive.CyArk.org/>

- *Heritage Sites*

The Heritage Sites section of the website provides the public and professionals with an interactive map to understand the various projects and cultural sites that are at risk. Each project links to the map with various resources such as fly-through videos, detailed imagery, 3D models and historic references and descriptions.

- *Professional Features*

By registering with CyArk, professionals can receive access to data and point cloud features. A fully featured CyArk Point Cloud Viewer is available with tools to measure point clouds and other capabilities. Professional quality data is also available for on-line viewing and as downloads. Professionals also have the opportunity to share their stories through the CyArk blog.

U.S. INSTITUTE OF BUILDING DOCUMENTATION [USIBD]

The USIBD, a non-profit corporation, promotes and facilitates building documentation as an industry. The organization is currently in development and is working towards defining best practices in building documentation, creating a certification program and providing educational resources for professional use. The USIBD is a membership program offering five individual membership categories based on professional registration or licensure, experience and employment affiliation, and an additional five categories for corporate memberships. By establishing standards, guidelines, and best practices, USIBD is able to ensure productivity, quality and accuracy of digital documentation practices. Collaboration is encouraged; the USIBD website affords documentation professionals the opportunity to exchange and review data. Accessible educational resources and a certification program will support further facilitation of information. Through the support of CyArk, LiDAR News, SPAR International and others, the USIBD will add value to digital documentation in establishing an industry to promote, guide, and educate within the building documentation arena.

RESOURCE HIGHLIGHTS: USIBD

- *Standards*
 - USIBD Manual of Building Documentation
- *CBDP Certificate Program*
 - Certified Building Documentation Professional
- *Organization Structure*
 - Board of Directors
 - Seven Committees

A. STANDARDS

- *USIBD Manual of Building Documentation*

The USIBD is in the process of creating a document to serve as the main repository of the USIBD's standards. It will contain information on best practices, compliance programs and standards. USIBD will develop other documents to support the manual. These documents will include RFP templates, specification templates for owners that are obtaining documentation services, and a scoring guide. Individuals will be able to access the manual and supportive documents through the website and mobile devices in a downloadable PDF. The document will include the following sections:

 - Introduction
 - Users Guide - to educate on philosophy of standards
 - Table of Contents
 - Preface
 - Best Practices - core principles
 - Compliance Program
 - Standards - to grow as standards evolve
 - Appendices - sample deliverables
 - Glossary
 - Index of Figures
 - Acknowledgements
 - Bibliography

B. CERTIFICATE PROGRAM

- *Certified Building Documentation Professional*

The creation of the "Certified Building Documentation Professional" certification will provide recognition and identification of dedicated building documentation professionals. USIBD will develop the certificate program based on the core principles and best practices set in the standards.

C. ORGANIZATION STRUCTURE

- *Board of Directors & Seven Committees*

A Board of Directors will oversee seven committees, each with a purpose statement and scope of responsibilities outlined on the USIBD website. Every third Friday of the month, the Leadership Team will hold a web meeting that allows each committee chair to report on their committees and current activities. As the USIBD organization continues to develop, the committees will participate in all aspects of the organization creation from marketing, budgeting, membership coordination, and defining the standards. The seven committees are as follows:

- Budget
- Communications
- Education
- Legal
- Membership
- Standards
- Technology

HERITAGE MANAGEMENT ORGANIZATIONS

ENGLISH HERITAGE

English Heritage is an executive non-departmental public body of the British Government, officially known as the **Historic Buildings and Monuments Commission for England**. This large conservation organization serves as the primary advisor of the historic environment. Established under the terms of the National Heritage Act of 1983, English Heritage's main function was to maintain historic monuments. The Secretary of the State appoints a board of up to sixteen commissioners who have oversight for the work of English Heritage. Funding comes from two avenues: the government and revenue earned from the historic properties and services. By understanding, valuing, caring and enjoying historic places, English Heritage helps to identify and maintain heritage sites and ensure their protection for future generations. English Heritage has direct ownership of several historic sites and works with private owners to manage sites. A number of grant programs assist with the cost of caring and protecting historic structures and environments. English Heritage has a professional membership organization that offers resources, advice, publications and training for areas within preservation as well as maintains the annual survey of England's historic environment.

RESOURCE HIGHLIGHTS: ENGLISH HERITAGE

- *Programs & Resources*
 - HELM: Online training and education
 - Heritage Counts: Inventory and collection system; annual report and theme
- *Documents*
 - Report on identifying need for good practice in large data management ("Big Data"); surveys, workshops and case study research.
 - MoRPHE: Guidelines and good practice in research and heritage management; includes templates and technical guides.
 - Corporate Plan 2011-2015
- *Website*
 - Accessibility to information, Training, Archives, etc..
 - Collaboration
 - Updated Resources
- *Organization Structure*
 - Commission as the Governing Board
 - Executive Board
 - Committees and Panels
 - Rules We Follow (Governance Documents, Standing Orders, Scheme of Delegations, Terms of Reference, Declarations of Interest)

A. PROGRAMS & RESOURCES

- *Historic Environment Local Management (HELM)*

English Heritage established HELM to provide support to the local government in preserving and protecting the historic environment. HELM offers accessible online information, training and guidance for local authorities, regional agencies and national organizations. Created in 2004, it is a source for tools and guidance to strengthen skills and confidence within preservation of the historic environment. The website has five primary areas of support that provide definitions, guidelines, case studies, opportunities and training.

- *Areas of Support:* Regeneration and Design, Understanding and Recording, Place and Placemaking, Managing and Protecting, and Funding
- *Resources:* Guidance Library, Training Programs, and Case Studies
- www.helm.org.uk

- *Heritage Counts*

English Heritage produces an annual survey of the historic environment of England called Heritage Counts. The survey identifies the social and economic role of the historic environment through a selected theme for that year. The Historic Environment Forum of English Heritage produces the survey and creates a national report and nine regional reports that explore the theme and key changes of England's historic state. The report covers changes in policy and the historic environment through a) various listed buildings, b) heritage at risk, c) planning application decisions, d) employment and skills, e) funding for heritage, and e) economic and social benefits. The purpose of the survey is to maintain updated information and data needed to make successful decisions and policy changes. Most importantly, the survey highlights the current and important issues of the particular theme through three **indicators**:

- Understanding the Assets – the extent of historic assets and existing information related to them
- Caring and Sharing – the condition of assets and the resources available to manage them
- Using and Benefitting – the economic and social benefits derived from active use of the historic environment

B. DOCUMENTS

- *Preservation and Management Strategies for Exceptionally Large Data Formats: "Big Data"[2007]*

The Archaeology Data Service, in partnership with English Heritage, investigated preservation, usability, and dissemination strategies for exceptionally large data files. The project is in response to the challenges that result from the large data produced by

archaeologists, researchers and cultural resource managers working within the historic environment. The use of laser scanning, LiDAR, computer modeling, digital footage and maritime surveys has created large data sets. In response, English heritage instigated the Big Data project to develop support and recommendations. The project's primary aim was to create good practice in large data preservation, dissemination, reuse and access.

- Process toward good practice:
 - Define Big Data: technologies, deliverables, storage methods and projects
 - Identify existing good practice in related fields
 - Identify list of creators and users of Big Data
 - Introduce a User Survey to identify:
 - Current good practice
 - Issues
 - Accessibility of data, i.e., short and long term
 - Repeated use of data
 - Future strategies
 - Create Preservation and Data Access on Suitable Pilot Studies:
 - Set recommendations on preservation and storage options
 - Identify and describe characteristics required in documentation
 - Identify and describe characteristics required in interpretive needs
 - Identify and describe characteristics required in storage and archiving
 - Document goals:
 - Encourage communication and review in user community
 - Disseminate results through conference papers or conference sessions
- <http://archaeologydataservice.ac.uk/research/bigData>
- *Management of Research Projects in the Historic Environment (MoRPHE):*
English Heritage offers a free document with guidelines for managing research and development of the historic environment. This resource provides general principles of good practice in project management and an application framework that fits a range of projects and needs. Included are project planning notes and technical guides with specific details, standards and guidelines for various types of projects.
 - <http://www.english-heritage.org.uk/professional/training-and-skills/training-schemes/short-courses/project-management-using-morphe/>
- *Corporate Plan*
In 2011, the Minister for Tourism and Heritage of English Heritage created a Corporate Plan for 2011-2015. The plan provides a context for work in the historic environment and outlines the priorities and budget for the future of English Heritage. It presents the mission and business plan for the organization and describes the four primary aims of English Heritage: understanding, valuing, caring, and enjoying. Fourteen targets were

identified and the key performance indicators for measuring success of the described plan. (<http://www.english-heritage.org.uk/about/who-we-are/corporate-information/corporate-strategy/>)

- *Other Documents to Note*
 - *Digital Archiving Programme: Preservation Management Procedures Manual [2002]*

The English Heritage's Center of Archaeology created a document to guide professionals in evaluating and accessioning data into the digital archive system.

<http://www.english-heritage.org.uk/publications/digital-archiving-programme/>
 - *Encouraging Investment in Heritage*

<http://www.english-heritage.org.uk/professional/research/social-and-economic-research/encouraging-investment/>
 - *Measured and Drawn*

C. WEBSITE - www.english-heritage.org.uk

- *Professionals Tab*

The English Heritage website offers various resources and information for professionals, government officials and managers within the historic environment. It includes access to archives, publications, training information, and updated practices and technologies. The Professionals tab area provides detailed resources within:

 - Research: Area to receive expert advice and standards
 - Archives and Collections: Resource to extensive collection of items within the historic National Collections
 - Heritage Protection: Provides information about the process of protecting the historic environment
 - Advice: Planning advice, project management, and updated policies
 - Publications: Provides access to a wide range of publications published by English Heritage
 - Funding: Section to learn more about the grant schemes and sources of funding throughout English Heritage
 - Training and Skills: Area to access information on training schemes, HELM, and shared experience

D. ORGANIZATION STRUCTURE

- *Commission*

The Commission that governs English Heritage establishes the overall strategic direction of the organization within the framework agreed upon with the government. This body oversees the requirements and use of public funds within the English Heritage and is the only government structure allowed to make binding decisions. Seventeen members make up the Commission, appointed by the Secretary of State, based on their skills and expertise within one or more professional areas.
- *Chief Executive & Executive Board*

The Commission delegates a Chief Executive who serves as the operational manager who manages the accounting officers. An Executive Board meets monthly to ensure the organization's leadership supports the Executive Director in meeting objectives, managing efficiently and effectively, and achieving value. The Executive Board is comprised of the executive directors from each of English Heritage's four operational groups: National Collections, Heritage Protection and Planning, National Advice and Information, and Resources.

- *Committees & Panels*

Three non-executive committees advise the staff and the Commission on specific strategies and policies within English Heritage. These committees consist of the English Heritage Advisory Committee, London Advisory Committee, and the Designation Review Committee. Five additional committees serve to assist in Structure of internal business; the committees include finance, human resources, and audit and risk assurance. Six non-executive panels offer expert advice on standards and practice in specialist fields such as Battlefields, Historic Parks and Gardens, and Industrial Archaeology

SMITHSONIAN INSTITUTION

James Smithson, a British Scientist, left his estate to the United States government to create "an establishment for the increase and diffusion of knowledge." With these funds, the government established the Smithsonian Institution in 1846 as a trust with the Board of Regents. It has developed to be the largest museum and research complex in the world, comprised of a National Zoo, nine research facilities and nineteen museums. The Smithsonian continues the original mission of James Smithson with the vision of "shaping the future by preserving our heritage, discovering new knowledge, and sharing our resources with the world." Some of the priorities of the institution include broadening access through digitization of collections, revitalizing education, and developing organizational excellence to serve the mission.

RESOURCE HIGHLIGHTS: THE SMITHSONIAN INSTITUTION

- *Programs & Resources*
 - Museum Conservation Institute (Research Center)
- *Archival Systems*
 - Smithsonian Institution Archives
 - Archives of American Art
- *Data & Technology Management*
 - Creating a Digital Smithsonian
 - Digitization Strategic Plan
 - Digitization and Digital Asset Structure Policy
- *Website*
 - Resources for Educators, Kids, Researchers, Volunteers, Members and Fellows/Interns
- *Organization Structure and Planning*
 - Board of Regents

Of the nine research centers, the Smithsonian created a center for conservation of the museum's collections. The Museum Conservation Institute engages in research and the study of artistic, anthropological and historic objects. These areas of study can be better understood through advanced techniques and technologies used to analyze the subjects. This particular research informs composition and cultural context. Professionals also apply this research to continue development of strategies for improving conservation practices. Through conservation inquiry, technical studies, consulting and conservation courses, the Museum Conservation Institute supports preservation work and other professional organizations.

- **Technical Studies:** The Technical Studies branch of the Museum Conservation Institute focuses on the analytical and technical support and research of conservation work. The analytical support is for conservators, scientists, fellows, interns and visiting scholars. Because some external organizations have limited facilities, staff and expertise, they rely on the work of the Institute. With their specialized knowledge, the Smithsonian supports projects other than their own endeavors.

The advanced equipment and technology includes:

- Fourier Transform Infrared Spectroscopy (FTIR)
 - Gas Chromatography-Mass Spectrometry (GC-MS)
 - Laser Ablation ICP-MS
 - Optical Microscopy with Image Analysis (OM-IA)
 - 3D Scanning
 - X-Ray Diffraction (XRD)
- **"Taking Care" (Guidelines):** The "Taking Care" resource tab on the Institute's website provides access to published guidelines for a variety of conservation work. In addition to the professional resources, the Institute also created brochures of guidelines for personal use. These guidelines cover general topics such as dating of resources, disaster resources and art conservation organizations. Some of the more specific categories include furniture and wood objects, objects (ivory, watches, musical instruments, and communication devices), paintings, paper-based materials, bugs, insects and pests, and textiles. Several of these guidelines are in Spanish.
 - **Bibliographic Database of Conservation Information Network (BCIN):** The work of the Museum Conservation Institute is stored through an international collaboration with the Bibliographic Conservation Information Network (BCIN). The BCIN is a complete bibliography resource for the conservation, preservation and restoration of cultural property. (http://www.bcin.ca/English/home_english.html)

Available Cited Literature:

- Books (published and unpublished)
 - Conference Data
 - Technical Reports
 - Audio Visuals
 - Journal Articles
 - Theses
 - Software Files
- Imaging Studio: The institute uses the Imaging Studio to share and disseminate the work with technical conservation. The records vary in scale and dimensions. (<http://www.si.edu/MCIIImagingStudio>)
- Resources:
 - Microscopy
 - 3D Scanning
 - RTI
 - Multispectral
 - HDRI
 - Spectroscopy
 - Gigapixel
 - Movies

B. ARCHIVAL SYSTEMS

- *Smithsonian Institution Archives*

The Smithsonian has an expansive archive that is devoted to the capture, preservation and dissemination of the Institution's history. The Smithsonian Institution Archives is a collection of records, available to the public, that represent the people, events, buildings, research and history of the Smithsonian. The staff manages the records created throughout the Institution and determines the long-term value of resources for research and institutional accountability. Preservation and conservation experts assist in the management and archival process to ensure proper maintenance. Historians and reference specialists provide service for the public, internal staff and visiting researchers. (<http://siarchives.si.edu/>)

- *Smithsonian Archives of American Art*

In 1954, the Director of the Detroit Institute of Arts and a Detroit executive and collector established the Archives of American Art in Detroit to serve as a microfilm repository of papers of American art held in other institutions. In 1970, the organization joined the Smithsonian Institution and expanded to the collection and preservation of original materials and documents. Today, the Archives is the world's most used research center,

providing access to documented primary sources of the history of the visual arts in America. The mission is to provide free accessible resources of American culture and art from the past 200 years for the public, researchers and other institutions, and to influence new ways of interpreting visual arts of America. The Archives currently serves as a primary source for dissertations, exhibitions, catalogues, articles and books on American art, artists and culture. (<http://www.aaa.si.edu/>)

C. DATA & TECHNOLOGY MANAGEMENT

- *Creating a Digital Smithsonian - Digitization Strategic Plan*

For the 2010-2015 Fiscal Years, the Smithsonian Institute implemented a strategic plan for digitization of materials, data and heritage information. The mission of the document is “to digitize the resources of the Institution for the widest possible use by current and future generations.” The plan outlines and defines the strategies for the digitization and dissemination of the collections and research within the Institution. The digitization will enhance accessibility and allow for multisensory views and experiences of information. The Institute will also digitize research, descriptions and interpretive information of the collections and objects themselves. This digitization initiative will broaden access, preserve the collections, support education and enrich context.

- Goals of the plan:

- Digital Assets: “Provide unparalleled access to Smithsonian collections, research, and programs by creating, managing, and promoting the Institution’s digital assets.”
- Digitization Program: “To pursue its mission in the 21st century, integrate digitization into the core functions of the Smithsonian.”
- Organizational Capacity: “Through novel, innovative approaches, secure sufficient resources and build capacity to create and sustain a digital Smithsonian.”

- Committee Charter: A Digitization Steering Committee, created in 2006 to discuss the digitization process, utilizes the collective knowledge and experience of the Smithsonian staff.

- *Digital Asset Access and Use - Directive Document*

This directive document defines the policy for the accessibility and use of digital material by the Smithsonian and non-Smithsonian users. Specifically, the criteria outline the appropriate use, access restrictions, and suggested fees to access and use digital materials. Such material includes the collection of art, digital heritage information, digitized imagery of resources and interpretive records. The directive identifies the responsibilities of the Smithsonian and legal, ethical and practical obligations. These factors reflect the resources required for the generation, maintenance and rendering of

digital assets as publicly accessible information. The directive outlines the scope, responsibilities, roles, definitions, and policies for the accessibility and use of the digital assets of the institution. (<http://www.si.edu/content/pdf/about/sd/SD609.pdf>)

- Access and Use Policy covers:
 - Internal Use
 - External Non-Commercial Use
 - Internal Requests for Commercial Use
 - External Requests for Commercial Use
- Allowable Restriction Categories covers:
 - Digital Assets Subject to Legal Restrictions
 - Intellectual Property Rights (Copyright, Moral Right, Trademark, Patent, Rights of Privacy and Publicity, and Personally Identifiable Information)
 - Contractual Restrictions
 - Native American Remains and Objects
 - Cultural Items
 - Endangered Species
 - Conservation Management
 - Digital Assets that Are Subject to Policy and Other Restrictions
 - Sensitive Content
 - Unpublished Research Data/Resources
 - Resource Limitations
- *Digitization and Digital Asset Management Policy - Directive Document*

In 2009, a strategic planning initiative recognized the need for a digitization management process for the organization. There was a need for a resource that ensures data is accessible for current and future generations. In this document, the Smithsonian defines the policy for the acquisition, creation, management and oversight of digital materials and documents. The digital data management plans are standards that recognize the importance of the expertise of professional efforts throughout the life cycle of digital resources. The policy also establishes and identifies the role of the Smithsonian's Digitization Program Officer (DPO), which is the primary overseer of the implementation of the plans.

 - "Effectively managing the Smithsonian's digital resources should:
 - Increase the number and quality of digital assets;
 - Enhance the usability and interoperability of digital assets;
 - Allow for greater interaction with users via different technology platforms, such as the Internet and mobile computing;

- Preserve digital assets that are in danger of loss due to deterioration or obsolescence;
- Enhance preservation of physical assets, including collections, by reducing wear and tear on originals;
- Use resources more effectively to achieve greater efficiencies in workflow, in use of technologies, and in use of the expertise that is available across the Institution.”

D. WEBSITE - <http://www.si.edu/>

The Smithsonian website serves a variety of purposes for museum and research center information, exhibit and event updates and as a resource for educators, children, researchers, members and volunteers, and fellows or interns.

- *Educators*

The area specific for educators offers resources and a laboratory for models and methods for innovative educational strategies. Such resources include teacher workshops, field trip information, opportunities to bring Smithsonian staff and experts to schools and communities, and student travel opportunities.

- History Explorer: Access to lesson plans and activities, interactive maps, museum artifacts, and books (<http://historyexplorer.si.edu/home/>)

- *Children*

The Smithsonian website offers a space to interact, learn and experience the many resources created specifically for children. Games and activities are available for online use to encourage children to learn and experience the various history and art of the Smithsonian.

- *Researchers*

This section of the Smithsonian website gives information on its research centers, field sites, training opportunities, published work and online datasets.

E. ORGANIZATION STRUCTURE

- *Board of Regents*

When Congress established the Smithsonian Institution in 1946, a Board of Regents assumed administration responsibility. The board is comprised of the Chief of Justice of the United States, the Vice President of the United States, three members of the United States Senate, three members of the United States House of Representatives, and nine citizens. Appointments of government members correspond with terms of election; the Board of Regents nominates citizen members for a six-year appointments. Meetings occur four times a year at the Smithsonian Castle Building.

- Duties and Responsibilities of the Regents: Descriptions of the specific roles of the Regents are available on the Smithsonian website. As the overseers of the Smithsonian Institution, the Regents are responsible for implementing the mission for the increase and diffusion of knowledge. Duties include:
 - Engage in meaningful discussion about the strategic plans and operations.
 - Review and approve ongoing and future strategic plans.
 - Establish major policies and oversee implementation.
 - Elect and evaluate the Secretary.
 - Act as ambassadors for the Institution.
 - Review and approve Smithsonian budgets.
 - Oversee the legal and ethical compliance.
- *Committees*

Nine committees carry out a majority of the work of the Board of Regents. Members of the committees also include citizens who do not serve on the Board of Regents. The committees meet throughout the year and report any findings, actions and recommendations directly to the Board. The Bylaws of the Board of Regents outlines each committee's purpose and responsibilities. Information on each committee, e.g., members, charters, and meeting minutes, is available on the Smithsonian Institution website. The following make up the Committees:

 - Executive
 - Advancement
 - Audit and Review
 - Compensation and Human Resources
 - Facilities
 - Finance
 - Governance and Nominating
 - Investment
 - Strategic Planning and Programs
- *Strategic Plan - Fiscal Years 2010-2015*

A strategic plan for the fiscal years 2010 through 2015 is a roadmap for the Smithsonian in addressing critical worldwide issues and defining the role of the Smithsonian for the 21st Century. The plan begins by identifying key priorities and then establishes the outcomes, goals, objectives and strategies.

 - Priorities:
 - Broadening Access through new tools and technologies
 - Revitalizing Education by working together to strengthen American education on a global scale

- Crossing Boundaries across disciplines to strengthen external relationships and leverage scholarship and experience in each field of knowledge
- Strengthening Collections to ensure future availability
- Enabling Mission Through Organizational Excellence
- Measuring Outcomes and successes of plan
- Goals:
 - Unlocking the Mysteries of the Universe
 - Understanding and Sustaining a Biodiverse Planet
 - Valuing World Cultures
 - Understanding the American Experience
 - Enabling Our Mission Through Organizational Excellence
 - Measuring Performance
 - Resource the Plan
- *Appendix A - The Strategic Planning Process*

Appendix A is a notable section of the plan that describes the strategic planning process. In 2008, the Smithsonian initiated a yearlong strategic planning process to set an overall direction for the plan. All 6,000 employees and approximately 1,500 stakeholders had the chance to provide input, making the planning process the most inclusive ever implemented in the Institution. The first step included surveys and interviews (face-to-face or virtually) to identify the strengths, weaknesses, opportunities and threats of the Institution. The second step explored the external forces that may affect the Smithsonian; workshops allowed participants to examine four specific scenarios that could potentially affect the nation and the Smithsonian. The scenario studies created a vision statement and document that informed specific goals and strategies to implement within the Smithsonian. The Smithsonian established the following five guiding principles:

 - Embrace and support the common Smithsonian vision.
 - Break down barriers among the sciences, between the sciences and the humanities, and between science and the public.
 - Redefine, deepen, and broaden external collaboration.
 - Experiment, innovate, and share.
 - Embrace a more global role.

The third step of the planning process identified four challenges within the programmatic strengths of the Smithsonian to determine and delineate goals, objectives, and strategies for each challenge. The last two steps were creating and writing the Strategic Plan.

THE GETTY CONSERVATION INSTITUTE

The Getty Conservation Institute is a private, non-profit institution that uses research, education, fieldwork, and knowledge dissemination to advance conservation practice. The Conservation Institute is a program of the J. Paul Getty Trust, a cultural and philanthropic institution dedicated to the presentation, conservation, and interpretation of the world's artistic legacy that serves the public and professional communities. As a leader in cultural heritage conservation, the Conservation Institute serves as a trusted source of information and education for cultural conservation. The mission of the institute acknowledges the importance of their role in the conservation community through their scientific research, education and training, model field projects, and the knowledge that benefits professionals and other organizations within the world's heritage conservation work. Specifically, the training and professional resources and the Guiding Principles document created by the Institute will serve as the primary case study in the training and resources recommendation for the NPS.

RESOURCE HIGHLIGHTS: THE GETTY CONSERVATION INSTITUTE

- *Guiding Principles for Recording and Documenting Cultural Heritage*
 - Resource for methods, tools and technologies
 - Two-part document with detailed information on documentation and recording technologies and methods
 - Clear and comprehensive information; provides case studies to assist in selecting best methods (illustrated examples)
- *Programs & Resources - Training*
 - Education and Training (Education Department)
- *Website*
 - Access to projects
 - Provides additional links and resources

A. GUIDING PRINCIPLES

- *Recording, Documentation, and Information Management for the Conservation of Heritage Places: Guiding Principles*

This document provides a comprehensive overview of the fundamental principles, guidelines and strategies for documenting cultural heritage places. The focus of the book is to provide up-to-date information on how to integrate documentation into conservation projects. It provides heritage managers and professionals with a resource to gain a better understanding of their role and responsibilities in cultural heritage while educating them on the reasons for investing in the documentation process. It provides readers with information about how to make informed decisions, understand the capabilities of using documentation methods, and create a framework for incorporating documentation practices into cultural heritage projects. Through a series of questions,

the book aims to identify and define all aspects of documenting and recording cultural heritage sites.

Document includes (with some selected questions):

- Executive summary
- Definitions
- The Guiding Principles
- Background
 - How did this book come about?
- Overview
 - What are we talking about?
 - Why is heritage information required?
 - Who is producing information, and who is using it?
- Guidance
 - Why record and who produces records?
 - What suggested approach ensures systematic documentation and good information management?
- Appendixes
 - Principles for recording defined by ICOMOS
 - Summary of gaps and needs
 - Project examples
 - Overview and evaluation of information management tools
 - Developing a National Heritage Information Policy
 - Overview of existing charters and guidelines
- Glossary
- Annotated Bibliography
- *Recording, Documentation, and Information Management for the Conservation of Heritage Places: Illustrated Examples*

The Illustrated Examples document is a companion resource to the Guiding Principles. It offers a more technical focus intended to assist heritage managers and conservation professionals in selecting recording tools and methodologies. Through case studies and project narratives, professionals can gain a better understanding of documentation and recording tools; the descriptions are helpful in selecting the appropriate method for cultural preservation work.

Document includes (with some selected case studies):

- Introduction
 - Tools Overview
- Base Recording: Gathering Information
 - Rapid Assessment

- Defining Cultural Landscapes
- Mapping Features
- Condition Assessment: Working with Information
 - Recording Streetscapes
 - Surveys
- Data Management: Analyzing Information
 - Structural Assessment
 - Inventories
 - Virtual Solutions
- Other Tools for Investigation and Monitoring
 - Subsurface Conditions
 - Monitoring Movement
 - Traditional Techniques
- Appendixes
 - Teaching Approaches
 - Contacts
- Glossary
- Annotated Bibliography

B. PROGRAMS & RESOURCES - TRAINING

- *Education Department*

The Getty Conservation Institute (GCI) created an international resource for education and training of site managers and other professionals. The Education Department offers a series of courses, workshops, and meetings for conservation professionals to address issues. The department has established academic partnerships through existing education institutions that allows collaboration and sharing of information and development. In addition to the various training courses offered in conservation, the education department has created teaching materials available for educators. A great deal of the work within the Institute occurs in locations where there is limited access to conservation training and education. The education department developed new learning models as a means of providing participants with better access to instruction. For example, they have integrated “blended learning,” a combination of classroom-based teaching with web-based learning and mentoring. The creation of online communities further addresses the need for collaboration between professionals. (www.getty.edu/conservation/about/education)

- Training and Education Opportunities:
 - Fundamentals of the Conservation of Photographs
 - Training of wall painting conservators in China

- Directors' Retreats for Conservation Education

C. WEBSITE - <http://www.getty.edu/conservation/index.html>

- *The Getty Conservation Institute*

The website provides access to conservation projects, publications and resources. There are links to newsletters, bulletins, technical resources and project videos. Interested individuals can access education department information as well as various teaching resources for conservation practitioners. Information is available on the site regarding other departments within the Conservation Institute, such as the Field Projects Department and the Science Department. The accessibility of past and current projects along with the numerous publications and resources are a critical component to the dissemination and work of the Getty Conservation Institute.

DATA SERVICES

ARCHEOLOGY DATA SERVICE [ADS]

Originally established in 1996 as a service provider for the Arts and Humanities Data Service (AHDS), the Archeology Data Service (ADS) preserves digital data and promotes good practice in the use of digital data. The ADS provides free accessibility of high quality and dependable digital data resources in support of research, learning, and technology. In addition to the dissemination of a large range of digital data, the ADS offers technical advice to digital documentation research professionals. The resource of the Guides to Good Practice, created in collaboration with the Digital Antiquity, will further inform our recommendations of accessibility and standardization for the NPS. (<http://archaeologydataservice.ac.uk/>)

DIGITAL ANTIQUITY

As a multi-institution, collaborative non-profit organization, Digital Antiquity works towards ensuring the long-term preservation, management, accessibility and use of archaeological data. Digital Antiquity also oversees the Digital Archaeological Record (tDAR), which is an international repository for digital records of archaeological projects, research, and organizations. The goal is to transform archaeological data and research to be more accessible. Created in 2009 by the collaboration of professionals involved in archaeology research and practice, today an Independent Board governs Digital Antiquity. (<http://www.digitalantiquity.org/>)

RESOURCE HIGHLIGHTS: ADA & DIGITAL ANTIQUITY

- *Documents: Guides to Good Practice*
- *Digital Data Repository (Digital Antiquity)*
 - The Digital Archaeological Record (tDAR)
- *Websites*
 - Accessibility
 - Links and Resources to data management strategies, guides to good practice, repositories
- *Organization Structure (ADS)*
 - Management Committee

A. DOCUMENTS – GUIDES TO GOOD PRACTICE

- The Guides to Good Practice series is the result of a collaboration project between the UK ADS and Digital Antiquity in the US. The objective is to improve the practice and preservation of digital information, which is critical for safely conserving archival information for future use. The series addresses the concerns of managing and preserving digital data. Two years of collaboration created six ADS Guides and the development of additional documents to include areas of marine survey, laser scanning,

photogrammetry and digital video and audio. The guides aim to provide information on the best way to create, manage, and document digital data and materials. The guides provide background, strategies, and general themes to identify the project workflow to create digital data and efficiently gather and manage data. The document includes discussion of common file types and basic components. The core chapters address preservation and data collection and the processing and analysis techniques of photogrammetry, laser scanning, GIS and CAD. The final section deals with preparing digital data for storage and depositing material in a digital archive. *(To view the full guidelines: <http://guides.archaeologydataservice.ac.uk/g2gp/Main>)*

Management:

- Digital Archiving- background information
 - About the Guide Series
 - How to use the Guides
 - What is Digital Archiving?
 - Archival Strategies
- The Project Lifecycle- preplanning phase
 - Planning for the Creation of Digital Data
 - Project Documentation
 - Project Metadata
 - Data Selection: Preservation Intervention Points
 - The Project Archive: Storage and Dissemination
 - Copyright and Intellectual Property Rights
- Basic Components
 - Documents and Texts
 - Databases and Spreadsheets
 - Raster Images
 - Vector Images
 - Digital Video
 - Digital Audio
- Data Collection and Fieldwork
 - Aerial Survey
 - Geophysics
 - Marine Survey
 - Laser Scanning
 - Close-Range Photogrammetry
- Data Analysis and Visualization
 - GIS

- CD
- Virtual Reality
- Preparing and Depositing Your Archive
 - Preparing your Archive
 - Depositing at the ADS (UK)
 - Depositing at tDAR (USA)

B. DIGITAL DATA REPOSITORY - DIGITAL ANTIQUITY

- *The Digital Archaeological Record (tDAR)*

The repository tDAR offered by Digital Antiquity allows professionals to search, create and share digital data. It is designed to support educators, researchers, organizations and other professionals within the collection of archaeological data. In 2011, tDAR integrated the National Archaeological Database (NADB), created by the National Park Service, which supported the development of a web service for management and support of data. (<http://www.tdar.org/>)

Users:

- Federal, State and Local Government Agencies
- Cultural Resource Management and Private Consulting Firms
- Academic Presses
- Academic Researchers and Organizations
- Educators

Uses:

- Managing information in one place
- Organizing documents, data sets and images
- Sharing current research
- Publishing data
- Protecting confidential materials
- Preserving documents, data and images
- Fulfilling NSF, NEH and other data management plan requirements
- Complying with NHPA, ARPA, and 36 CFR 79

C. ORGANIZATION STRUCTURE - ADS

- *Management Committee*

A committee manages the ADS and meets bi-annually. Committee members are representatives from the founding bodies, user communities and ADS internal management group. The ADS website includes information and access to every annual report from 1996 as well as the current management papers. The Management Committee members focus their time during meetings on developing strategic vision and identifying priorities, routes and means to further collection and preservation. The Committee works on securing a financial base and developing a business model.

Additionally, the Committee monitors and reviews progress and usage of projects and activity. Members represent stakeholder communities to promote standards and guidelines for best practices. The members have no legal liability and serve purely as advisors.

FEDERAL AGENCIES DIGITIZATION GUIDELINES INITIATIVE [FADGI]

In 2007, a collaborative effort by federal agencies developed and defined guidelines, methods and practices for the maintenance and collection of digital historic content. The hope is that the guidelines will provide a common practice that will encourage and strengthen research projects and results. With these common practices, collaboration can be encouraged among federal agencies and institutions that will enhance the final product for public use. In addition to the guidelines, the case study will highlight the approach and process involved in creating common standards for federal agencies.

[<http://www.digitizationguidelines.gov/>]

RESOURCE HIGHLIGHTS: FADGI

- *Documents - Process & Guidelines*
 - Development Approach and Objectives
 - Common Standards

A. DOCUMENTS

- *Guidelines Initiative*

The initiative began under a program initiated by Congress in December 2000 that looked to develop a national strategy in collecting, archiving and conserving digital data. The Federal Agencies first worked towards identifying and prioritizing the most important areas of digital data. In the development of the guidelines, it was clear that there was a need to accommodate the use of specialized needs and expertise. FADGI formed two working groups to meet this need: the Federal Agencies Still Image Digitization Working Group and the Federal Agencies Audio-Visual Working Group. The goal of the Still Image Working Group is to create digitization guidelines for still image materials. The Audio-Visual Working Group works to establish and disseminate information on standards and practices for digital formatting of audio-visual materials for federal agencies. Those involved defined a common approach early in the initiative to develop technical guidelines and standards. Participation of federal agencies is non-binding and voluntary, and those engaged are encouraged to share information, resources, and methodology practices. Part of the review process includes making draft documents available to download on the website. These documents include specific guidelines and general practices. Each document goes through the review process by the appropriate working group. Frequently the groups post these documents during the analysis process. The website breaks down the documents by the status of the review

process for clear accessibility. Comments are encouraged on all documents via a linked form that goes back to the working group.

- Common Objectives:
 - guidelines should be based on clearly articulated objectives describing the expected uses of the digitized content;
 - methodologies and requirements should be based on recognized approved standards or empirical data to the extent possible;
 - work must be prioritized by project forecasts, impact of guidelines that are incomplete, dated or non-existent, and estimated effort to develop a robust guideline;
 - the efforts undertaken through this federal initiative are to be conducted in a transparent manner, sharing not only conclusions but the approach and reasoning;
 - the participating members actively seek input from the public, governmental and academic institutions, as well as corporate entities and trade organizations.

- Working Groups:
 - Both groups have outlined -- Purpose, Scope, Federal Participants, Non-Federal Experts and Planning by Objectives, classes of content.
 - Within the groups are sub-groups that work on more specific data and practices.
 - Still Image Working Group
 - Goals:
 - Defined categories and characteristics of content to be digitally represented
 - Defined objectives and specifications for the digital masters by category
 - Common image performance measures and methods of validating those measures to defined requirements
 - Expected Deliverables:
 - Definitions of digitization objectives
 - Standard classifications of content types
 - A foundational model describing imaging quality/performance characteristics and metrics
 - Technical and process definitions
 - Published draft and final digitization guidelines within the scope of this charter
 - Published conceptual framework for the digitization process
 - Development of a public web site to communicate the Working Group's activities including the posting of draft and final guidelines
 - Audio Visual Working Group

- **Goals:**
 - Define the categories of content to be digitized
 - Define objectives and specification for the digital masters by category
 - Determine performance measures for digitization and develop methods for validation
 - Recommend methods for digitization
- **Expected Deliverables:**
 - General digitization guidelines for sound recordings
 - Documentation of one or more target formats for the reformatting of video
 - Recommended strategies for certain categories of born-digital video
 - Development of a public web site to communicate the Working Group's activities
- *Guidelines (currently available for comments)*
 - Still Image Working Group
 - Technical Guidelines for Digitizing Cultural Heritage Materials (Still Image Working Group)
 - Digital Imaging Framework
 - Audio Visual Working Group
 - MXF Application Specification
 - Embedded Metadata in Broadcast WAVE Files
- **Other Guidelines**
 - Audio Analog-to- Digital Converter Performance
 - Content Categories and Digitization Objectives
 - Digitization Activities- Project Planning
 - File Format Comparison
 - Minimal Descriptive Embedded Metadata in Digital Still Images
 - TIFF Image Metadata
- **Additional Resources Available**
 - Articles
 - Bibliographies
 - Documentation
 - Presentations
 - Reports
 - Workshops

TRAINING SERVICES

NATIONAL CENTER FOR PRESERVATION TECHNOLOGY AND TRAINING [NCPTT]

The mission of the NCPTT is to advance the application of science in technology to historic preservation. Through training, education, research, technology transfer and partnerships, NCPTT works and partners with universities and laboratories around the U.S. Projects and training events take place at National Park Service sites, federal agencies, universities, state historic preservation offices and non-profit organizations. International partnerships in preservation organizations further promote the understanding and application of preservation technology to cultural needs. By participating in nationwide seminars and workshops, professionals have the opportunity for education, project collaboration and information sharing. The NCPTT's website provides access to preservation publications and resources. Grants and partnerships that distribute preservation, and education and training, are all highly promoted attributes through the NCPTT. Projects funded include several areas; archeology, architecture, collections management, engineering, historic landscapes, materials conservation, and sustainability. [<http://ncptt.nps.gov/>]

RESOURCE HIGHLIGHTS: NCPTT

- *Education & Training*
 - Online Webinars
 - Workshops
 - Conferences
- *Resources & Publications*
- *Grant Funding*
- *Organization Structure*
 - PTT Board

A. EDUCATION & TRAINING

NCPTT offers education and training opportunities in various categories and forms. Lectures, webinars, workshops and conferences provide accessible and varied educational opportunities. An upcoming webinar focuses on disaster preparedness of cultural resources. This free series of presentations, available over a two-day period, provides information on the issues and needs involved in disaster preparedness. The workshops are typically "hands-on," partnered with the Association for Preservation Technology (APT), and address concepts and methods of preservation practices. Information regarding the workshops identifies the target audience, specifying which professional groups would benefit most. Other events often involve community projects or various work with non-profit partners. For instance, the NCPTT will be holding a workshop to help Girl Scouts earn Save Outdoor Sculpture patches.

B. RESOURCES & PUBLICATIONS

Part of the education and training mission of NCPTT is to provide resources and publications. The website offers access to these various documents organized by category. Among the documents are “Applications of Digital Photogrammetric Methods for Preservation Documentation of Historic Homes,” “Analysis of the NFPA Fire Safety Evaluation Systems for Business Occupancies,” and “Ft. Livingston, Grand Terre Island Field Report.” Interested persons can find guidelines discussing materials use, project field notes and reports, product and tool manuals, and various preservation articles. Since there is such a large range of information available, the NCPTT serves as a great source for general guidelines, preservation methods and projects, and detailed technical support.

C. GRANT FUNDING

NCPTT offers grant funding opportunities for innovative projects. The purpose of the grant program is to support projects that develop new technologies, adapt existing technologies or encourage expert meetings in the discussion of preserving cultural resources. The projects that receive funding typically look to advance the application of science and technology in historic preservation and cultural heritage. Restoration or brick and mortar projects do not qualify for the grant program. The timeline for submittals is from September to mid-October each year. The NCPTT website outlines the requirements for submissions, as well as a map and chart of all projects funded through the grant program. NCPTT recognizes the important role of collaboration; many projects involve partners such as government entities, private organizations, tribes, museums, universities and non-profits.

Call for Proposals include information on:

- Mission
- NCPTT Grant Program Requirements
- Research Priorities
- Eligibility
- Review Criteria
- Other Considerations
- Grants Administration
- Proposal Preparation (package outline)

D. ORGANIZATION STRUCTURE

- *Preservation Technology and Training Board (PTT)*

In 1992, the organization created the PTT board to provide leadership, professional oversight and policy advice. The board also oversees the allocation of grant funding and annual reports. Thirteen members sit on the board, appointed by the Secretary of the Interior. Six members represent Federal, State and local agencies; the Secretary selects another six members based on their professional qualifications within major organizations. These individuals represent such fields as archaeology, architecture, conservation, curation and historic preservation. The board members hold term for four years, and their main duty is to advise the Secretary of the Interior on the operations of the NCPTT.

SUMMARY OF CASE STUDY ANALYSIS

The following chart (page 41) provides a summary of identified strengths and available resources for all external organizations reviewed as case studies.

External Resources for Establishing a Digital Documentation Program in the NPS-IMR. This chart features CoPR’s research of several organizations involved with various aspects of digital documentation. Through case studies and analysis, we identified organizational strengths in terms of practices, resources and programs.

RESOURCES AVAILABLE IN EACH ORGANIZATION														
ORGANIZATIONS	Standards & Guidelines		Publications & Resources		Professional Development			Website		Data Storage		Organization Management		
	Data Collection	Data Management	For Educators Lesson Plans (LP) Articles (A) Presentations (P) Other (O)	For Professionals & Public News (N) Blog (B) Articles (A) Presentations (P) Research (R) Other (O)	Training	Educational Resources	Programs	Internal Use	Public Interpretative Maps (M) Imagery (I) 3D Models (3D) Videos (V)	Internal	External	Management	Documents	
Digital Documentation	CYARK	The CyArk 500 Project Standards and Procedures & Total Process for Digital Preservation	The CyArk 500 Project Standards and Procedures & Total Process for Digital Preservation	LP, A, P, O: Teacher Advisory Committee	N, B, A, O: Point Cloud Support; Limited Data Access	Through partnerships	Through partnerships		Professional access to point cloud features.	M, I, 3D, V: Heritage Sites	X	Iron Mountain		
	USIBD	USIBD Manual of Building Documentation (in development)	USIBD Manual of Building Documentation (in development)		To be included as organization develops		USIBD Manual of Building Documentation	Certificate Program - Certified Building Documentation Professional	To be included as organization develops		To be included as organization develops	Board of directors & Seven committees	Committee reports and documents to be accessible as developed	
Heritage Management	ENGLISH HERITAGE	MORPHE & specific data collection technology manuals	Digital Archiving Programme: Preservation Management Procedures Manual; Preservation and Management Strategies for Exceptionally Large Data Formats: "Big Data"		A, N, R, O: All within the Professionals Tab on website	HELM	various manuals for technologies and documentation	HELM: Heritage Counts	Professionals Tab; Editing capabilities to draft documents	M, I: Heritage Site information		Commission; Chief Executive & Executive Board; Committees & Panels	Corporate Plan	
	SMITHSONIAN INSTITUTION		Creating A Digital Smithsonian; Digital Asset Access and Use; Digitization and Digital Asset Management Policy	LP, A, P, O: Smithsonian professionals visit classrooms	A, N, P, R, O: Taking Care Guidelines	MCI Imaging Studio; classes, internships, & consulting	MCI Technical Studies	Museum Conservation Institute (MCI)		I, V, O: History Explorer	Smithsonian Institution Archives; Smithsonian Archives of American Art (undetermined if internal or external)	BCIN	Board of Regents; Nine Committees	Strategic Plan - Fiscal Years 2011-2015; Appendix A- The Strategic Planning Process
	GETTY CONSERVATION INSTITUTE	Guiding Principles	Guiding Principles	LP, A, P	A, P, R, O: Current and Past Project	Education Department	Guiding Principles	Field Project Department		M, I, V				
Data Services	ADS & DIGITAL ANTIQUITY	Guides to Good Practice	Guides to Good Practice		P, R, O: Guides to Good practice		Guides to Good Practice		Ability to edit and comment on developing documents.		tDAR	Management Committee		
	FADGI		Guidelines		A, P, R, O: Bibliographies			Guidelines Initiative	Ability to review process of guidelines, reports and other documents.			Working Groups	Working Group goals, objectives, scope and participants.	
Training	NCPTT			A, P, O	N, A, P, R, O: Grant Funding Information	Webinars, presentations, research, and workshops.	Webinars, presentations, research, and workshops.	Archeology & Collections, Architecture & Engineering, Historic Landscapes, and Materials Conservation				PTT Board		

SECTION THREE: SUMMARY AND RECOMMENDATIONS



SECTION THREE: CONCLUSION AND SUMMARY OF RECOMMENDATIONS

Conclusion

As we gathered and analyzed information during this project and shared our research findings with the IMR Working Group, the CoPR team arrived at three primary conclusions that inform our recommendations.

- There was a need to establish an inventory of DD projects within the NPS-IMR.
- NPS questionnaire respondents provided valuable feedback that led to Cooperator's recommendations.
- Cooperator found that the activities and focus of various preservation and heritage organizations produced some excellent examples and resources.

Recommendations for a Digital Documentation Program in the National Park Service Intermountain Region

CoPR's recommendations take into account the needs and challenges identified by IMR staff and lessons learned through the research process internally and externally. For implementation of a successful Digital Documentation Program, we encourage the NPS-IMR to consider actions in the following categories:

STRATEGY AND GOALS WITHIN NPS-IMR

- Develop a strategic vision with rationale and shared understanding for the use of 3D digital documentation.
- Establish clear goals with adequate resources.
- Consider the value of digital documentation expertise in hiring decisions, determining workloads, promoting staff and creating incentives.

INTERNAL STRUCTURES AND MECHANISMS RE: INFORMATION, COORDINATION, COMMUNICATION AND TRAINING

- Develop organizational structures and mechanisms to regularly and systematically capture and maintain an inventory of 3D digital documentation activities. For example:
 - Create a central database and a searchable central archive.
 - Consider staffing and systems to maintain a central database.
- Establish vehicles for *internal* communication, not just "top-down," but colleague to colleague.
- Establish vehicles and incentives for cross training and project-sharing.
- Establish educational and informational vehicles in support of external communication, cross-training and project sharing *outside* NPS-IMR.

- Create training programs; establish easy access to available training and up-to-date resources.
- Create and offer cross-discipline training for NPS staff to include management, documentation practitioners, contracting administrators, etc. Consider inviting representatives of contract groups, partners and cooperators.
- Current interactive technology and communications technology makes it possible to share information and gather knowledge in “real-time.” That said, we recognize the need for guidelines, guidebooks and manuals to provide a framework and to ensure consistency. Because technology and practice is changing so rapidly, one criterion of manual development should be adaptability. *(See Section Four: “Resources” for examples.)*

MANAGEMENT PRACTICES; DECISION-MAKING AND RESOURCE ALLOCATION

- Develop criteria and guidelines for 3D digital documentation project selection and resource allocation.
- Implement standardized processes for 3D digital documentation data collection, storage, management, and sharing.
- Establish a collaborative group of professionals within the NPS-IMR to develop and manage standards and guidelines.
- Determine cost-effective strategies for acquiring and utilizing equipment and technologies.

CONTRACTING

Issues with contracting span across all of the previous categories. Because many responders mentioned challenges and needs in this particular arena, we did not want it to get lost in the above categories.

- Consider involving contractors in the development of criteria and guidelines for 3D digital documentation project selection and resource allocation.
- Once criteria and guidelines are established, meet with current and potential contractors to agree upon expectations, roles and practices. Those involved with contractors at the Park level should be involved.
- Consider workshops with current and potential contractor and digital documentation practitioners within the NPS-IMR. The purpose of these workshops is to educate one another on need, challenges, limitations and best practices.
- Review NPS templates for contracting; ask for resources and/or guidance on creating templates for 3D Digital Documentation contracts. Encourage education of NPS contracting staff.
- Review best practices guidelines for contracting, including other fields. *(See Section Four: “Resources” for examples.)*