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Collections Management Systems at Natural History Museums: A Centralized Approach

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Collections Management Systems at Natural History Museums:
A Centralized Approach

Keywords: Collections Management, Natural History Museums, Unification, Centralization,
Decentralized, Museum Studies, California Academy of Sciences.

by
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Capstone project submitted in partial fulfillment of the requirements for the Degree of Master
of Arts in Museum Studies

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ABSTRACT

Natural history museum collections are an invaluable learning tool for audiences of many ages. However, learning experiences can be hampered if collections are poorly managed. Inconsistent object numbering systems, scant information associated with a specimen, and differences in records management styles of individuals in the same organization all stem from the lack of collections management standards set forth by some institutions. Natural history museums historically manage their collections in a decentralized manner, with each collections department responsible for its own objects, managing records as the staff sees fit. This report advocates for the unification of collections in natural history museums in order to centralize accessioning methods and optimize record entry. By means of a literature review, project proposal, and action plan, the report argues that unification of collections in natural history museums will enable them to meet their missions of public education.

Keywords: Collections Management, Natural History Museums, Unification, Centralization, Decentralized, Museum Studies, California Academy of Sciences.

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ACKNOWLEDGEMENTS

CHAPTER 1: INTRODUCTION

A rock, a stone, a fragment of quartz in the collection of a natural history museum could all be regarded as the same object depending upon the cataloger and catalog standards of an institution. Difference in collections management styles stems from a lack of unique standards for information collection and records maintenance. This aspect of collections management is challenging for natural history museums that encompass a multiplicity of scientific collections, but must work as a single unified entity to support their mission. The methodology of decentralized collections management is troubling for natural history museums, the professionals employed by them, and scholars requesting information from their collections because it creates ambiguity in vocabulary among object and specimen records, redundancy across scientific disciplines, and inefficient working methods.

The purpose of this capstone project is to investigate the topic of collections management systems at natural history museums, identify the problems that arise from decentralized catalogs, and propose a solution. The literature reviewed in the following section, Chapter 2, will focus on the trend of decentralized collections management systems historically employed at natural history museums of the United States. An argument will be presented for the lack of records management standards, both past and present, and why this proves to be disastrous for natural history museums. Using the California Academy of Sciences in San Francisco, CA, as a primary case study of a natural history museum with decentralized collection management practices, the project proposal and action plan presented in Chapters 3 and 4, respectively, will offer a course of action to remedy inconsistent collection management practices to create a unified system across the entire institution.

Through personal and professional experience, it is the author's observation that museums with decentralized collections management systems do not operate to their highest potential in regards to streamlining productivity across departments, particularly for the role of the museum registrar. The goal

of the following report is to improve the collections management system to best serve the needs of the California Academy of Sciences. An effect of the procedures set forth in the action plan, if followed, is an increase in the productivity of multiple departments of the institution, including all scientific collections as well as exhibits. Objects will be able to be accessioned in a streamlined and consistent manner for every department. Additionally, object records across every scientific collection will be more easily accessible for Academy employees or outside scholars and researchers who request collection and specimen information. Another outcome of a successful implementation of this proposed project is increased accessibility of collections to researchers and scholars. The mission statement of the California Academy of Sciences is to "explore, explain, and sustain life (California Academy of Sciences, 2016)." A unified collection management system, by simplifying collection record accessibility, will amplify the mission impact of "explaining life."

This system can then be utilized as a case study and template for other museums in the natural history field to improve their current decentralized or ineffective collections management systems. If adhered to and employed by organizations, this project will improve a museum's operational needs by providing an enhanced organizational tool for collections management, particularly for organizations with a wide range of collections.

CHAPTER 2: A HISTORY OF COLLECTIONS MANAGEMENT SUCCESSES AND DIFFICULTIES AT MUSEUMS IN THE UNITED STATES

Introduction

Even in today's era of advanced technology and shared information, there is a lack of consistency between museums on the necessary data needed for collection catalogs. Furthermore, inconsistencies may arise in individual museums on the standards of information captured for objects within collections. This paper will review the history of collections management systems at museums in the United States, acknowledge the lack of standards in cataloging objects, and argue the difficulties in registration and collections management that rise from these acts. This literature review will summarize with a project proposal to advance the museum field's view on cataloging standards for certain collections.

Collections Management at Museums in the United States throughout History

Based off of European cabinets of curiosities (also known as Wunderkammer, Kunstkabinett, and Cabinets of Wonder), the United States formed its first collections of scientific and natural history specimens around the nineteenth century (Buck and Gilmore, 2006). These European collections typically held artifacts of natural history, religious studies, works of art, and antiquity to convey the individual owner's wealth and worldly standing. Over time, Rebecca A Buck and Jean Allman Gilmore note (2007), "In terms of use and content, museums moved from cabinets of curiosities held by individuals to collections that represented specific disciplines" (pg. 5). Objects were grouped together to convey a presence of order, one collection for all natural history specimens, one collection for all works of art, etc. Just as museums evolved out of cabinets of curiosity, the role of the museum curator developed from the owners of the cabinets.

Curators often solely collected objects to support the research they wanted to conduct. This was the base of the collecting system used by the Smithsonian Institutions (Lubar, 2015). The earliest

Smithsonian collections in the mid-nineteenth century were compiled from individual collectors' donations. This shifted over time. By 1939, there was a noticeable and documented change in the incoming objects and specimens accessioned into the Smithsonian Institutes. These objects were mostly collected on global expeditions and from findings during curatorial research and not from donations, as they had been acquired in the past (Lubar, 2015). The Smithsonian curators' expeditions were guided by the personal research of the scholar, based upon their own interests and not to further the development of a more well-rounded collection for their institution as a whole. There were no rules in place by their parent institutions on what they could and could not collect. In this way, curators proved that they could not be managed. It was left to their personal "expertise" (Lubar, 2015). This collection style ultimately had a negative impact on the next generation of Smithsonian workers. In the 1960s-1970s, Smithsonian curators and researchers began to complain about their current collections, those compiled by the previous cohort of curators. Some complained about the sheer number of objects in the museum's collections and the care required for each piece. Others complained that what was in the collections did not tell the whole story (Lubar, 2015). For example, the Smithsonian Museum of History and Technology had never acknowledged or collected artifacts from the African American experience (Lubar, 2015). Lubar emphasizes (2015), "As long as curatorial research interest determined collecting, it would be scattershot, and focused, for the most part, on the kind of artifacts useful for a good scholarly monograph, and not necessarily those that would tell a larger story" (pg. 88).

The Smithsonian was not alone in its frustrations with its existing collections. Until this point in time, curators were the standard in museums as the record keepers. Known as "keepers" (as they still are in Great Britain), these individuals were responsible for providing some sort of order to the museum's collections (Schwarzer, 2006). However, curators were often more concerned with collecting more objects than documenting all of their existing collection specimens. The 1960s and 70s became known as an era of a "collections crisis" (Lubar, 2015). Problems arose with the fundamentals of

collections and records management: curators saw that they could not piece together the history of their own institutions, let alone the history of their collections; museum professionals from the Depression era were retiring and taking all the collection knowledge with them; and institutions that were generating records for their objects were overwhelmed by the amount of paperwork (Samuel, 1984). Museum professionals started to regard the collections as a burden, and not as strength of the museum. There were no catalogs, no storage space, too many objects, and there was no use for them (Lubar, 2015). Because of this, museums began hiring registrars and collections managers to better control the physical and intellectual care over their collections (Lubar, 2015). Individuals in these roles kept track of where collections were and where they were going, documenting their condition and the provenance. Curators reacted to this shift in responsibility by finding better ways to utilize their collections, and eventually, changing how they collect (Lubar, 2015). Records management did not begin with the introduction of specialized registrars in the 1960s and 70s. Many museum professionals utilized effective catalog systems that began in the world of libraries.

The American modern museum starters – athenaeums (early precursors to institutions for literacy or scientific study) and curiosity cabinets – were closely connected to libraries and held this close relationship between museum and library institution well into the twentieth century (Samuel, 1984). The first collection control systems evolved out of library cataloging systems (Buck and Gilmore, 2006). This change in museum collection management systems came to light with Henry Watson Kent's entrance into the field. As a trained librarian, Kent relied on his learned skills utilizing the Dewey Decimal system of library classification when he was recruited to New York's Museum of Modern Art (MoMA) in 1905 (Buck and Gilmore, 2006). Shortly after his arrival, Kent began developing and implementing a new system of compiling blue index cards for each object accessioned into the museum. These cards contained high-level information to detail and catalog each object within the museum, much like how a card catalog acts for individual books in a library. His renovation of the collection management system at

MoMA served in the past (as well as today) as a model for object cataloging in America. Evelyn K. Samuel writes (1984), "Kent had attended the first course in Library Economy taught at Columbia College by Melvil Dewey in 1884… He began [the MoMA catalog system] by creating an accession record and then started a card catalog" (pg. 147). Samuel continues to state (1984), "Like libraries, museums use classification to bring similar objects together and subject indexing to provide alternate access points or finding aids" (pg. 148). Card catalog systems of inventory and registration of museum objects did not stay secluded to the East Coast. Museum professionals on the West Coast were also discovering the benefits to utilizing card catalogs for their collections.

Joseph Grinnell was the founding Director of Berkeley's Museum of Vertebrate Zoology (MVZ) in 1908. The earliest collection database utilized by the MVZ was designed by Grinnell. The handwritten records on archival paper were developed to capture individual specimen data, tracked by locality, and supplemented with any available ecological and behavioral information about the specimen (Sunderland, 2013). Over time, Grinnell expanded and transformed this database with the introduction of a card catalog to link all specimen data together, connecting photos, labels, field notes and correspondence. It was an effective cataloging system that covered a wide range of information (Sunderland, 2013). By the late 1970s, advances in technology made computerized collections management systems cheaper and more effective than handwritten catalogs. In 1978, the MVZ took advantage of the technological advances and began to digitize their collection using a program called Taxir (Taxonomic Information Retrieval), which is most like Microsoft Excel today. The MVZ took their 154,000 specimens and proposed to capture 24 fields of data in Taxir. By 1981, they had completed computerizing nearly their entire collection (Sunderland, 2013).

In the early days, the MVZ had standardized index cards for cataloging specimens as they were accessioned into the museum. Under Grinnell's guidance, collectors were encouraged to document the

same information for any object they collected for the museum. This information documented for each object corresponded to prewritten fields on the cataloging index card that would be filled in by the curator or cataloger (Sunderland, 2013). In this way, each and every specimen was accessioned into the collection with the most amount of standardized information necessary for the collections purpose. Although this practice could be standard for individual collections within a museum, the standards did not carry between different institutions. According to Bernadette G. Callery (2005), "Historically, the museum collection management literature has encouraged museums to develop their own information systems and policies as appropriates to their individual collections and audiences" (pg. 108).

A Lack of Standards – Past and Present

Museums, as a whole, do not approach object cataloging in the same way. When literature started to be released in the early 1900s about collections management, there was nothing written about standards for specimen descriptions (Callery, 2005). Callery notes (2005), "Introducing his 1927 guide to the management of small museums, (Laurence Vail) Coleman specifically does not recommend standardization of practice, but intends to provide a 'firm foundation for individuality'" (pg. 109). In this way, museums could personalize their approach to records management and catalog systems depending upon the individual needs of their collections and institution. Katherine and Philip Spiess (1990) also note the lack of standards in museum collections systems:

> When the object or collection enters a museum, there is no single, comprehensive
>
> approach guiding its management and use. Rather, each museum, drawing from its own
>
> history and the traditions and culture associated with its collections, and the experience
>
> of private and public collecting in its field, organizes and manages its collections to meet
>
> its own program needs. (pg. 142)

Much like how each museum facility is different and built to fit the needs of its personal collection, the museum's collection management system is just the same, constructed by the museum to fit their specific needs and expectations.

Specimen labels usually include the following information: name of collector, type of organism, date and place it was collected (Rogers, 2016). These details were usually handwritten in the 18th or 19th century (Rogers, 2016). However, labels usually do not follow any standardized format across institutions. In some cases, standardized label formatting may not even exist within singular museum collections. Inconsistency in handwritten labels from the 18th and 19th century can slow a museums progress in digitizing their collections today. As early as the 1960s, museums began to transfer their object catalogs and collections information to computer databases. In some instances, photos or scans of the existing handwritten documentation was uploaded into computer programs to assist with the data transfer. However, these types of imaging software cannot search certain parts of the labels for the information they need, because the structure of information within the specimen labels is not consistent (Rogers, 2016). The California Academy of Sciences in San Francisco is currently working to digitize their entire herbarium collection. In order to combat the challenge of digitization and information transfer, Anne Barber (former CAS Digitization Project Manager) assisted in developing software that helps to scan handwritten labels and print the captured text of object information in the appropriate fields of the digital database (Rogers, 2016). Even with this advanced software, there are still errors that humans have to correct, which is expensive and time consuming (Rogers, 2016). The problems that arise in the transfer of object information into digital computer database systems is not the only issue encountered because of the unstandardized collections management approach to museums in the United States.

Difficulties with Unstandardized Collections Management

Not Every Object Has a (Sufficient) Record

As previously mentioned, museum professionals are known to complain about their predecessors and the sheer number of objects they left within their museum's collections. In many cases, objects can be found in a collection that were never properly accessioned and cataloged with their own individual record number. Additionally, objects may be found in collections with less than desirable amounts of information about its collection process: where it is from, when it was collected, etc. The American Association of Museums' report *Museums for a New Century* (1984) noted, "The lack of information about a number, location, and condition of objects, artifacts and specimens in the nation's museums is a handicap to adequate care and maintenance of these collections and to scholarly progress in general" (pg. 53). An object should be able to be produced when a document is chosen at random from a registration system. Likewise, documentation for any object should be readily available and easily accessible. In this instance, the collections management problem lies within one museum. Issues can also arise when information is attempted to be shared across institutions.

There is a Lack of Consistency

Prior to the turn of the 20th century, museums applied sequential numbering systems (1, 2, 3…). By 1909, institutions were using two part numbering systems (1909.1, 1909.2, 1909.3… for the first three objects collected in 1909, for example). By 1927, there was evidence of the three part system being used in museums (1909.1.1, 1909.1.2, 1909.1.3… for the first three objects of a set of a collection collected in 1909) (Buck and Gilmore, 2006). Problems with museum collections occur from these numbering systems because of the inconsistency between institutions (Buck and Gilmore, 2006). Inter-museum loans or title transfers can become difficult and confusing if close attention is not paid to maintaining (or changing) accession and object catalog numbers when appropriate. Inconsistencies can be introduced to a catalog system previously reliably conserved if, for example, an object is accessioned

from a two part numbering institution to a three part numbering institution without a new catalog number being generated for the object.

Information is Separated

One issue that affects both individual museums and the field as a whole is the separation and siloing of collections. Access to collections through online catalogs limits the user to searching by discipline (Callery, 2005). The libraries that museums modeled their cataloging systems after could easily standardize documentation and care of their collections because they deal with multiples of a similar material that do not have varying requirements. Museums on the other hand house a vast number of different objects, made of different materials, which require different elements for care and preservation (Buck and Gilmore, 2006). Even though museums had long since collected photographs, drawings, field notes, and correspondences associated with collected specimens, the earliest databases did not allow curators or registrars to connect the data together (Sunderland, 2013). Written documentation for a single object may be kept in one database, while the corresponding visual information such as photographs could be housed in a completely separate database. Alternately, a single museum may employ several different databases, managed on completely differently platforms and capturing varying depths of information for each type of collection based on discipline. This is the reason for many natural history museums to maintain different collections for each scientific discipline (mammalogy, geology, anthropology, etc.) across their institution. This proves to be a difficulty for museum professionals that require quick and easy access to all objects accessioned and housed by the museum as a whole.

Conclusion

Joseph Grinnell, founding Director of Berkeley's Museum of Vertebrate Zoology, advocated that the scientific value of each specimen depended on the information associated with it (Sunderland, 2013). Museum collections are only useful when they can be properly utilized by museum professionals, scholars, and researchers. It is of the opinion of this author that every object in a collection deserves proper documentation in order to maximize its utility. There is a wealth of information that was discovered through the research of the topic of collections management systems within the United States and the standards (or lack thereof) that define these systems. The challenge is to apply these lessons to guide the development of a set of standards to properly catalog the existing permanent geology collection at the California Academy of Sciences in San Francisco, California. This standard can then be used as a prototype for geology collections management systems throughout the United States in order to properly catalog all specimens within geology collections.

CHAPTER 3: A PROJECT MANAGEMENT PLAN FOR CENTRALIZING SEPARATE NATURAL HISTORY COLLECTIONS WITHIN A SINGLE INSTITUTION

California Academy of Sciences Collection Management Unification Project Management Plan

The purpose of the Collection Management Unification Project Management Plan is to create a single, centralized computer platform for all permanent collections at the California Academy of Sciences. Currently, every collection within the institution is managed on different platforms. This approach to collections management proves to be inefficient for the employees of the institution, particularly the Registrar who works across all departments to access object information for exhibitions developed in-house, standard maintenance and conservation, or security reasons. In order to create a more efficient collection management system for the entire organization, it is strongly urged that all scientific collections within the Academy be compiled into one database on one platform.

Many options exist today in regards to collection management database software platforms. Furthermore, much research has been conducted to determine which database platform best serves and meets the needs of different types of collections, from fine art to natural history. It is out of the scope of this Project Management Plan to assign the final database platform for use by the California Academy of Sciences in its course toward Collection Management Unification. Instead, this Project Management Plan will operate under the assumption that a customizable collection management platform, such as PastPerfect Museum Software or EmbARK Collections Management Software for example, is the chosen software for the unification of all collections within the Academy. In this way, all current museum collection databases will be transferred to the customizable platform. Additionally, all new accessions will be processed through the customizable platform.

The customization features that many collection management database software systems provide let the user to select which information fields they wish to provide input on for accessioned objects. This allows for the ability to pick and choose what object information to include in an object

record as well as the ability to structure object information input fields in a database multiple orders or

views depending upon the requirements of the user's institution or collection (See Figure 1). Multiple

layouts and views can also be created to expand upon an object or specimen and provide further

descriptions and data for those that access the database for information.
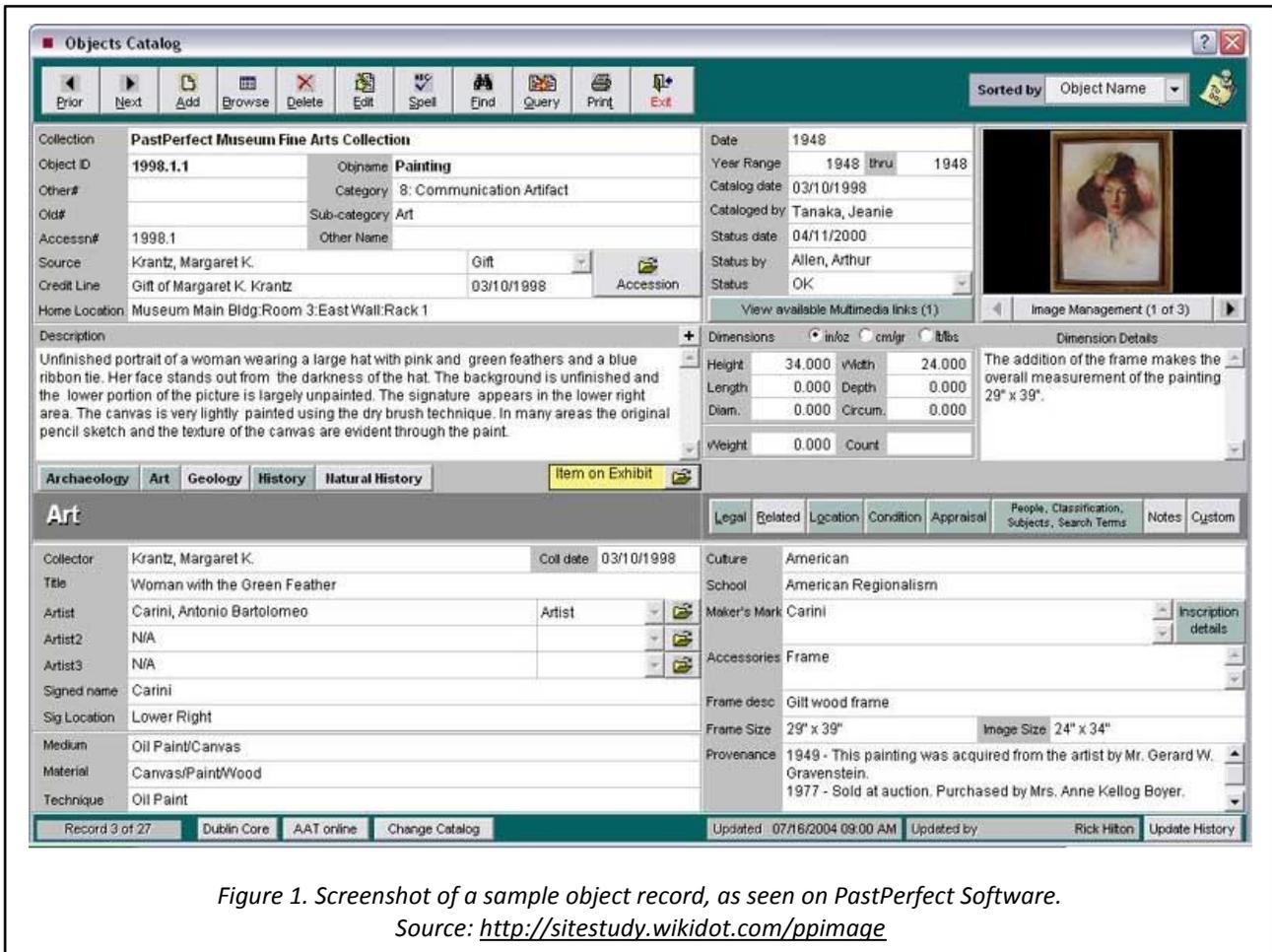
Figure 1. Screenshot of a sample object record, as seen on PastPerfect Software.
Source: http://sitestudy.wikidot.com/ppimage

For the purposes of this Project Management Plan, the California Academy of Sciences will be

employing a similar collection management database software system. This software will have the

ability to develop different views of information for an object, object grouping, or exhibition. These

views will hereby be known as "pages". This Project Management Plan will only address the object view

of the collection management database platform, as the other types of views are out of this scope of

work. The collection management software system will have the ability to create a single cover page of high-level object information, much like the upper left corner of Figure 1. Additionally, the software in use will be able to create secondary pages depending upon the selection made by the software user based on the collection discipline the object belongs to, much like the bottom left corner of Figure 1.

A Project Manager will be elected to manage the Collection Management Unification Project Management Plan in its entirety. The role of the Project Manager will be to ensure the completion of all delegated tasks in the appropriate time allotted. The Project Manager may be elected either internally from the institution, or hired specifically for this unification project. This position will not be responsible for other registration, collections, or exhibitions duties while completing this project.

Goal 1: Centralize Accession Process

The primary goal of this project is to unify all collections within the California Academy of Sciences. To do so, a new collection management system will be employed across the entire institution for all objects, specimens, and artifacts accessioned into the Academy's permanent collection. Once a collection management system platform is selected, the Project Manager should choose a database format in which a single cover page is used for every object accessioned into the institution. This cover page is where high-level object information will be collected, such as unique accession number, object name, and provenance. The benefit of accession all objects through one system is that all objects and specimens that belong to the institute's permanent collection will be accounted for with unique records in the same, centralized database, and not on separate systems throughout the institution depending upon scientific collection. For the purposes of this project, I will not be focusing on the individual secondary platform pages for each collection type. The following Objectives demonstrate the measures that should be taken to achieve this goal of creating a centralized cover page for the unified collection management system.

Objective 1.1: Collaborate with Stakeholders

In order to create a collection management platform cover page that addresses object

information captured by every collection at the California Academy of Sciences, the Project Manager is

required to contact the Collection Managers or Curators for each collection discipline to gain feedback

on what information they find essential for every object record in their individual collection

management databases. The Project Manager will collaborate with these key stakeholders across every

collection to create a list of the object information that is universally captured by every collection when

a new object is accessioned or processed into the collection database. The insight gained during this

exercise will lead the Project Manager to begin Objective 1.2.

Objective 1.2: Modify Platform Cover Page

It will be the responsibility of the Project Manager to ensure the modification of the collection

management software platform cover page. To create a centralized collection management system for

the entire institution, it is essential that the information fields included on the cover page (and

subsequent collections pages) are generated based on the collaboration described in Objective 1.1. Only

the object information fields that were universally used as basic information across every collection

should be included in the object cover page. This process will not only ensure that the accession process

is standardized across the entire institution, but also ensures that every object accessioned into the

Academy is given a sequential, unique accession number. The new accession process employed by

implementing the Collection Management Unification Project will unite all collections into one database,

when they had previously been separate and managed in very different ways across collection

departments.

Goal 2: Optimize Data Entry

The second goal of the Collection Management Unification Project is to reduce the amount of

time needed for the stakeholders of Collection Managers and Curators to create new records in the

centralized collection management database for newly accessioned objects or add new specimen data

to existing records. By streamlining the object accessioning process, record generation time will be

decreased and productivity of the stakeholders will be increased.

Objective 2.1: Conduct User Training

After the completing of Objectives 1.1 and 1.2, the Project Manager will conduct user training to

orient the stakeholders in the functionality of the new collection management platform. Training will

address the procedures needed to complete object accessioning tasks on the new platform. It is

important to remind stakeholders that the end product is the same as it has been for the individual

collection management systems used in their collections previously, however displayed in an alternate

view.

This objective also addresses the issue of user buy-in. One deterrent to the success of the

Collection Management Unification Project could be the lack of acceptance by the Academy employees

that will be using the new platform on a daily basis. By training the stakeholders to efficiently use the

database system, they will become familiar with the accessioning process of the new platform. In this

way, the stakeholders will be educated and empowered on the new platform procedures, ensuring less

user push-back for the new system. Users will also be able to contribute to revisions that may be made

during Objective 2.2.

Objective 2.2: Collect Feedback

To continually improve functionality of the unified collection management database platform,

the Project Manager will collect user feedback provided at the culmination of Objective 2.1.

Stakeholders should be asked to record their thoughts on the placement of information fields within the

database pages, both for the cover page and the secondary page(s) corresponding to their scientific

collection. The Project Manager will then reconfigure the structure of the platform cover page to comply

with the needs of the project stakeholders. Feedback may also be provided for fields that should be added, deleted, or detailed further. For example, some collection disciplines may be satisfied with the inclusion of a credit line field, while other disciplines may request to include additional fields to record the historic provenance of their specimens.

When Objective 2.2 is completed, the Project Manager will be able to incorporate stakeholder feedback into the reconfiguration of the database, similar to Objective 1.2. After modifications have been made to the collection management software platform cover page based on the user feedback, the end product will be a platform that meets the accession needs of each Academy collection. With stakeholder feedback on the structure of the fields included in the platform cover page, the Project Manager will be able to create a layout that provides seamless transitions between information fields. These combined platform modifications will contribute to a smooth data entry process by the Collection Managers and Curators as they accession new objects into the unified collection management system.

Project Impact on the Museum Field

The Collection Management Unification Project Management Plan can be used as a prototype for natural history museums across the United States that wish to centralize their multiple collection management systems separated by scientific discipline. The California Academy of Sciences' collection management platform cover page and secondary collection pages could be used as a free standing template for other institutions to satisfy their need to centralize the collection management systems. Furthermore, if another natural history museum contains additional types of scientific collections, the Objectives stated above can serve as a guideline for developing a version of the collection management platform and collections pages that best serve the organization.

The model of creating a platform cover page and secondary pages for specific disciplines can be utilized by other types of institutions, including art and history organizations. In these cases, the

Objectives stated above would be completed in reference to the disciplines that apply to the organizations. For example, instead of options for accessing a Geology, Anthropology, or Herpetology secondary collection management page, an art institution would create pages for Modern, Contemporary, or Textile Art. Additionally, the institutions using this Project Management Plan as a model would need to collaborate with the Collection Managers or Curators of their collections to determine the appropriate fields to include on their platform pages.

CHAPTER 4: AN ACTION PLAN FOR CENTRALIZING SEPARATE NATURAL HISTORY COLLECTIONS WITHIN A SINGLE INSTITUTION

California Academy of Sciences Collection Management Unification Project Management Plan

Goal 1: Centralize Accession Process

Objective 1.1: Collaborate with Stakeholders

Task 1.1.01: Conduct meeting with Collection Manager of the Anthropology Department to view current Collection Management System

The Project Manager will meet with the Collection Manager of the Anthropology Department to view the current Collection Management System used by this department. The Project Manager will compile a list of all information fields utilized in the creation of new records for accessioned objects. Screenshots or print outs should be collected, if possible, for reference. This task will be completed congruently with other tasks of Objective 1.1, as individual schedules allow.

Start Date: 1/9/2017   Due Date: 1/25/2017

Task 1.1.02: Conduct meeting with Collection Manager of the Aquatic Biology Department to view current Collection Management System

The Project Manager will meet with the Collection Manager of the Aquatic Biology Department to view the current Collection Management System used by this department. The Project Manager will compile a list of all information fields utilized in the creation of new records for accessioned objects. Screenshots or print outs should be collected, if possible, for reference. This task will be completed congruently with other tasks of Objective 1.1, as individual schedules allow.

Start Date: 1/9/2017   Due Date: 1/25/2017

Task 1.1.03: Conduct meeting with Collection Manager of the Botany Department to view current Collection Management System

The Project Manager will meet with the Collection Manager of the Botany Department to view the current Collection Management System used by this department. The Project Manager will compile a list of all information fields utilized in the creation of new records for accessioned objects. Screenshots or print outs should be collected, if possible, for reference. This task will be completed congruently with other tasks of Objective 1.1, as individual schedules allow.

Start Date: 1/9/2017   Due Date: 1/25/2017

Task 1.1.04: Conduct meeting with Collection Manager of the Entomology Department to view current Collection Management System

The Project Manager will meet with the Collection Manager of the Entomology Department to view the current Collection Management System used by this department. The Project Manager will compile a list of all information fields utilized in the creation of new records for accessioned objects. Screenshots or print outs should be collected, if possible, for reference. This task will be completed congruently with other tasks of Objective 1.1, as individual schedules allow.

Start Date: 1/9/2017   Due Date: 1/25/2017

Task 1.1.05: Conduct meeting with Collection Manager of the Herpetology Department to view current Collection Management System

The Project Manager will meet with the Collection Manager of the Herpetology Department to view the current Collection Management System used by this department. The Project Manager will compile a list of all information fields utilized in the creation of new records for accessioned objects. Screenshots or print outs should be collected, if possible, for reference. This task will be completed congruently with other tasks of Objective 1.1, as individual schedules allow.

Start Date: 1/9/2017   Due Date: 1/25/2017

Task 1.1.06: Conduct meeting with Collection Manager of the Ichthyology Department to view current Collection Management System

The Project Manager will meet with the Collection Manager of the Ichthyology Department to view the current Collection Management System used by this department. The Project Manager will compile a list of all information fields utilized in the creation of new records for accessioned objects. Screenshots or print outs should be collected, if possible, for reference. This task will be completed congruently with other tasks of Objective 1.1, as individual schedules allow.

      Start Date: 1/9/2017   Due Date: 1/25/2017

Task 1.1.07: Conduct meeting with Collection Manager of the Invertebrate Zoology Department to view current Collection Management System

The Project Manager will meet with the Collection Manager of the Invertebrate Zoology Department to view the current Collection Management System used by this department. The Project Manager will compile a list of all information fields utilized in the creation of new records for accessioned objects. Screenshots or print outs should be collected, if possible, for reference. This task will be completed congruently with other tasks of Objective 1.1, as individual schedules allow.

      Start Date: 1/9/2017   Due Date: 1/25/2017

Task 1.1.08: Conduct meeting with Collection Manager of the Geology Department to view current Collection Management System

The Project Manager will meet with the Collection Manager of the Geology Department to view the current Collection Management System used by this department. The Project Manager will compile a list of all information fields utilized in the creation of new records for accessioned objects. Screenshots or print outs should be collected, if possible, for reference. This task will be completed congruently with other tasks of Objective 1.1, as individual schedules allow.

      Start Date: 1/9/2017   Due Date: 1/25/2017

Task 1.1.09: Conduct meeting with Collection Manager of the Ornithology & Mammalogy Department to view current Collection Management System

The Project Manager will meet with the Collection Manager of the Ornithology & Mammalogy Department to view the current Collection Management System used by this department. The Project Manager will compile a list of all information fields utilized in the creation of new records for accessioned objects. Screenshots or print outs should be collected, if possible, for reference. This task will be completed congruently with other tasks of Objective 1.1, as individual schedules allow.

       Start Date: 1/9/2017   Due Date: 1/25/2017

Task 1.1.10: Conduct meeting with Collection Manager of the Library Department to view current Collection Management System

The Project Manager will meet with the Collection Manager of the Library Department to view the current Collection Management System used by this department. The Project Manager will compile a list of all information fields utilized in the creation of new records for accessioned objects. Screenshots or print outs should be collected, if possible, for reference. This task will be completed congruently with other tasks of Objective 1.1, as individual schedules allow.

       Start Date: 1/9/2017   Due Date: 1/25/2017

<div align="center">Objective 1.2: Modify Platform Cover Page</div>

Task 1.2.01: Produce lists of collections management system information collected in Objective 1.1

Notes compiled for each meeting with departmental Collection Managers during Objective 1.1 will be produced in an organized manner by the Project Manager. Documents will be saved to the California Academy of Sciences secured internal server for future reference.

       Start Date: 1/30/2017   Due Date: 2/1/2017

Task 1.2.02: Compare lists; extract record fields that are universal across departments

From the multiple lists compiled in Task 1.2.01, the Project Manager will note which information

fields were universally utilized across every department for recording object information in the

individual collection management systems. These fields will be compiled into a separate list for use in

the cover page of the centralized collection management system.

Start Date: 2/2/2017   Due Date: 2/3/2017

Task 1.2.03: Conference with Senior Registrar to determine final fields to include in cover page layout

The Project Manager will present their findings on the universal information fields to their

supervisor, the Senior Registrar. The Senior Registrar will have final approval over which information

fields will be included in the cover page layout.

Start Date: 2/6/2017   Due Date: 2/6/2017

Task 1.2.04: Create mockup of centralized cover page

Based upon the final approved information from Task 1.2.03, the Project Manager will create a

mockup layout of the centralized cover page of the new collection management system. This Project

Manager will pay particular attention to the fields included as well as the layout of the fields for ease of

use.

Start Date: 2/7/2017   Due Date: 2/10/2017

Task 1.2.05: Send changes to database platform representative for production

The Project Manager will present the cover page layout mockup with the final approved

information fields to the outside database platform vendor. The Project Manager will collaborate as

needed with the Platform Representative to create the new collection management system cover page

that is compatible with the platform system already in place at the Academy.

Start Date: 2/10/2017   Due Date: 2/10/2017

Task 1.2.06: Database platform redesigns cover page based on changes sent by Project Manager

The outside platform vendor will produce the final stylized cover page on their software

systems, as delegated by the Project Manager.

Start Date: 2/13/2017   Due Date: 2/24/2017

Task 1.2.07: Once design is complete and returned from platform representative, test functionality of entire database

The Project Manager will receive the completed version of the cover page from the platform

vendor. They will proceed to test the functionality of each field and command by creating new object

records and modifying existing records.

Start Date: 2/27/2017   Due Date: 3/1/2017

Task 1.2.08: Create user profiles for each Collection Manager

Users must be approved to access certain functions of the centralized collection management

platform. The Project Manager will relay all approved user information to the platform vendor

representative for the creation of individual user profiles for each Collection Manager.

Start Date: 2/20/2017   Due Date: 2/27/2017

Task 1.2.09: Distribute login information to Collection Managers

Usernames and temporary passwords to access the centralized collection management platform will be distributed to the approved Collection Managers by the Project Manager.

Start Date: 3/1/2017 Due Date: 3/1/2017

Task 1.2.10: Launch cover page for use

The Project Manager will launch the new centralized collection management platform for use by the approved Collection Managers.

Start Date: 3/1/2017 Due Date: 3/1/2017

Goal 2: Optimize Data Entry

Objective 2.1: Conduct User Training

Task 2.1.01: Produce guide to assist users in basic database functions

The Project Manager will develop a user guide to illustrate the functions and commands to familiarize the Collection Managers to the new centralized platform. This guide will be saved as a reference document on the Academy secured internal server.

Start Date: 2/13/2017 Due Date: 3/1/2017

Task 2.1.02: Develop sample record creation/modification tasks for users to complete during training

To assist in user familiarization, the Project Manager will create a list of sample tasks to accompany the user guide initially referenced by the Collection Managers or new approved user. The test will instruct the user to create sample records and modify existing sample records to fully acquaint the user with the centralized platforms functions.

Start Date: 2/13/2017 Due Date: 3/1/2017

Task 2.1.03: Present user guide and sample task report to Senior Registrar for final approval

The Project Manager will present the user guide and sample task report to their supervisor, the

Senior Registrar, for final approval. If changes are requested, the Project Manager will repeat Tasks

2.1.02 and 2.1.03.

Start Date: 3/1/2017   Due Date: 3/1/2017

Task 2.1.04: Conference with Collection Managers to discuss implementation of new database system, user training, sample record creation, and feedback surveys

The Project Manager will host a meeting between all Collection Managers and Registration staff

to outline the implementation of the new centralized collection management database system.

Questions will be answered by the Project Manager and Senior Registrar as needed.

Start Date: 3/1/2017   Due Date: 3/1/2017

Task 2.1.05: Distribute user guide and sample tasks to stakeholders

The approved user guide and sample task reports will be distributed to the approved Collection

Managers for familiarization with the new system and ease of use in new record creation.

Start Date: 3/1/2017   Due Date: 3/1/2017

Task 2.1.06: Complete basic user training

The Collection Managers will follow the user guide received from the Project Manager to

acquaint themselves with the functionality of the new centralized collection management system.

Start Date: 3/1/2017   Due Date: 3/10/2017

Task 2.1.07: Complete sample record creation

The Collection Managers will complete the sample tasks received in a report from the Project

Manager to ensure their ability to create new records and modify existing records within the new

centralized collection management system. Sample tasks will include, but are not limited to, the

following: creating a new specimen record, revising existing record information, deleting a record, and

sorting records.

Start Date: 3/1/2017   Due Date: 3/10/2017

Task 2.1.08: Create user feedback survey

The Project Manager will produce a document for the Collection Managers to complete with

comments of their initial reactions and experiences using the new centralized collection management

system. The feedback survey will focus attention to the layout of the cover page, inclusion of

information fields, and overall ease of use.

Start Date: 2/13/2017   Due Date: 2/21/2017

Task 2.1.09: Distribute user feedback surveys

The Project Manager will distribute the feedback surveys to the Collection Managers**.**

Start Date: 3/1/2017   Due Date: 3/1/2017

Task 2.1.10: Complete feedback surveys

Collection Managers will complete the feedback survey with any comments or questions they

have about the abilities and functionality of the centralized collection management system as they

proceed to use the software and become familiar with the new procedures for data entry.

Start Date: 3/1/2017   Due Date: 3/10/2017

Objective 2.2: Collect Feedback

Task 2.2.01: Collect and review user feedback surveys

Collection Managers return the feedback surveys to the Project Manager for collection. The

Project Manager will review the responses noted on the feedback surveys.

       Start Date: 3/13/2017   Due Date: 3/17/2017

Task 2.2.02: Prioritize comments and opinions about page layouts and entry fields

The Project Manager will prioritize feedback comments in order of urgency to create a more

functional database.

       Start Date: 3/20/2017   Due Date: 3/22/2017

Task 2.2.03: Incorporate changes with top priority to cover page (and subsequent discipline pages)

The comments with top priority and highest urgency will be incorporated as the Project

Manager revises the collection management database cover page.

       Start Date: 3/22/2017   Due Date: 3/24/2017

Task 2.2.04: Send changes to database platform representative for production

The Project Manager will present the revisions to the cover page layout. The Project Manager

will collaborate as needed with the Platform Representative to revise the previously produced collection

management system cover page.

       Start Date: 3/27/2017   Due Date: 3/27/2017

Task 2.2.05: Database platform redesigns based on changes sent by PM

The outside platform vendor will produce revised cover page on their software systems, as delegated by the Project Manager.

Start Date: 3/27/2017 Due Date: 4/7/2017

Task 2.2.06: Create new user guide for redesigned layout

The Project Manager will revise the existing user guide to incorporate any changes made during Task 2.2.03. This guide will be saved alongside the original user guide as a reference document on the Academy secured internal server.

Start Date: 3/27/2017 Due Date: 3/31/2017

Task 2.2.07: Once redesign is complete and returned from platform representative, test functionality of entire database

The Project Manager will receive the completed version of the revised cover page from the platform vendor. They will proceed to test the functionality of each field and command by creating new object records and modifying existing records.

Start Date: 4/10/2017 Due Date: 4/12/2017

Task 2.2.08: Present revised user guide to Senior Registrar for final approval

The Project Manager will present the revised user guide to their supervisor, the Senior Registrar, for final approval. If changes are requested, the Project Manager will repeat Task 2.2.06.

Start Date: 4/12/2017 Due Date: 4/12/2017

Task 2.2.09: Distribute new user guide to stakeholders

The approved user guide will be distributed to the Collection Managers for use based on most recent changes made to the database.

Start Date: 4/13/2017 Due Date: 4/13/2017

Task 2.2.10: Launch revised cover page with incorporated user feedback

The Project Manager will launch the revised centralized collection management platform with incorporated changes from user feedback for use by the approved Collection Managers.

Start Date: 4/13/2017 Due Date: 4/13/2017

Task 2.2.11: Redistribute feedback surveys and respond to comments as needed

The Project Manager will distribute the feedback surveys to the Collection Managers. Collection Managers will complete the surveys with any further comments or suggestions for the database. The Project Manager will respond to the Collection Managers' questions and comments as needed.

Start Date: 4/13/2017 Due Date: Ongoing

Continuation of the Project

The Action Plan can be utilized for continued maintenance and redesign of the collection management system. The Project Manager can elect to revisit and repeat steps as changes are made, based upon user feedback, software updates to functionality, and organizational needs.

Once this Project Plan is completed and Collection Managers are entering newly accessed objects into the database system, the Project Manager will be responsible for entering historic object records into the system. An additional Action Plan will be created to migrate and integrate all existing object records from individual collection management systems to the centralized collection

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management platform. This Action Plan for the migration historic information is outside of the Scope of Work of this Project.

Budget of the Project

The time and wages of the managers and collaborators involved in this project are already incorporated into the existing operating budget of the Academy. The project will also utilize current technology employed by the Academy and will not accrue any additional costs for new collection management software systems or outside vendor representative labor.

CHAPTER 5: CONCLUSION

Success of this project will be measured by the overall acceptance of the unified collection management system from the primary stakeholders, namely the Registrars and Collection Managers of the California Academy of Sciences. If these members of the staff are able to adapt to the new centralized format of records management the project will be considered a success. Backlash from users is to be expected with any shift in collections management system. Collection managers and curators who are used to accessing their collections on a certain platform that looks a particular way may struggle and become frustrated when required to use a different system or approach to accessioning and managing objects. If an organization encounters too much resistance, the project may not be able to be continued. This is a negative possibility that the Academy Registrars may face in the future of the database project. Success can continued to be measured if the unified collection management system is still in use by the Academy Registrars and Collection Managers after the product is launched for use. It would be wise for the Project Manager of the unification project to provide open methods of communication with the primary stakeholders to continue to collect feedback on all aspects of the unified collection management system, similar to Task 2.2.11 in the Action Plan.

It is also recommended that the Project Manager collect feedback from the Collection Managers on increased efficiency in records management. A major goal of the unification project is to reduce record creation and modification time. By accomplishing this goal, Collection Managers will exhibit increased productivity in their records management duties. Collecting feedback will also enable the Project Manager to ensure the optimization of records keeping is occurring as expected. If it is discovered that the new platform is not allowing for expedited records creation and management as expected, the Project Manager will be able to collaborate with the platform vendor to make any necessary adjustments.

In order for the unified collection management system to be regarded as successful, the elected collection management platform will first need to produce a functioning system for the creation and modification of records. Continued collaboration with the Project Manager to ensure its maintained relevance for the Academy's collection needs is another component of sustained success. As feedback is collected from the Collection Managers on the functionality of the platform, it is a responsibility of the Project Manager to relay comments and requests to the platform vendor to ensure revisions are made to the system. With a goal of the highest quality product and exemplary customer satisfaction, the platform vendor will be able to determine if their services are successful based upon the customized collection management system they produce for the Academy.

The success of this project is important to the field of museums at large. The California Academy of Sciences is not an anomaly in its current approach to collections management. Many museums and institutions with collections, including but not limited to natural history museums, approach their collections management systems in a decentralized manner. If the California Academy of Sciences Collection Management Unification Project proves successful in terms of continued use of a newly implemented centralized system and optimization of data entry for new and existing records, the Project Management Plan can be used as a template for other institutions that wish to centralize their collection management systems as well. Furthermore, using these prefabricated Project Management and Action Plans will save other institutions both time and money in their undertaking of unifying their collection management systems.

A troubling question that remains unanswered on a personal level for the author is why this approach to collections management has not been taken by the Academy already. Well into its second century, the organization has not yet centralized its collections management operations. During the course of my research, I have learned that the Oakland Museum of California has recently centralized

their approach to collections management with much success. Historically, the Oakland Museum of California was three separate museums for art, history, and natural history, with separate collections for each museum respectively. Upon merging all three museums into one unified organization, the collections from each museum were also merged into one. It is unknown to the author if the change in collection management systems was met with apprehension or resistance from the Collection Managers, but this singular example proves the possibility of centralizing multiple collections into one unified system.

I hope that the California Academy of Sciences will be able to select and utilize a unified collection management system in the near future. Research suggests that the way the Academy manages their collections in a decentralized manner is "a thing of the past". From the Academy's building operations, public programing initiatives, and extensive field research, it is evident that the goals of the Academy are to continue to make great advances in scientific research and global sustainability. It follows that an institution so committed to innovation and excellence apply the same principles to its collection management system as well. Such a project would align the Academy's back-of-house record keeping practices with its public facing image. Centralizing collections management platforms is the next step in modernizing the California Academy of Sciences.

APPENDIX A: ANNOTATED BIBLIOGRAPHY

Buck, R. A., & Gilmore, J. A. (2007). *Collection conundrums : solving collections management mysteries*. Washington, DC : American Association of Museums.

Buck and Gilmore give technical insight into the persons and dates important to the development of collection and catalog practices at American museums. Their narrative addresses the first introduction of registrars with Stephen C. Brown at the Smithsonian Institute in 1880, the development of the American Alliance of Museums' first code of ethics, established in 1925, and Dorothy H. Dudley and Irma Bezold (Wilkinson), registrars and writers of the first Museum Registration Methods, published in 1958. Other aspects of the history of museum object catalogs and the people that influence their development are noted throughout this book.

I will use this source to give historical context into the history of the major contributors to museum cataloguing systems used in America. For example, in the book, Henry Watson Kent's past as a librarian and student of Melvil Dewey is highlighted to provide context on his professional abilities and success as a museum registrar and director, as well as the importance of his "blue card" indexing system which he carried over from libraries to museums. These specific examples will be helpful to personify the history of museum collection systems in its earliest and most successful uses.

Callery, B. (2005). Patterns of identification of potentially sensitive data in Natural History Museum Online Catalogs. *Journal Of Internet Cataloging, 7*(1), 103-115. doi:10.1300/J141v07n01_07

This study was conducted between November 2003 and February 2004. It examines 23 United States and Canadian natural history museums and found that even with online collections catalogs, the tradition of separate collections for each field of scientific study at a museum reigns as the standard. Callery cites that historically, museums were encouraged to develop independent collection management and information systems based upon the specific needs and audiences of the individual scientific disciplines at their institution.

Callery provides researched evidence into the collections management systems of multiple American natural history museums. The author notes that the "silo effect" of separated collections management systems is used by a majority of the natural history museums contacted in their study. I will use this as evidence of the troubles of decentralized museum collections management and the problems that can arise from this type of structure. I will also comment on Callery's research into the topic of creating standards for collections management purposes.

Carpinone, E. C. (2010). *Museum Collections Management Systems: One Size Does NOT Fit All*. (Unpublished master's dissertation). Seton Hall University, New Jersey.

In the first portion of her thesis, Carpinone tracks the development of museums and their databases throughout the decades, from the 1960s to the 1990s. She then goes on to gauge the strengths and weaknesses of multiple collection management database systems on the market today,

studying their effectiveness at varying types of institutions in order to determine the best fit for each kind of museum.

I am extremely interested in the tables of information provided in the appendices of this thesis. Carpinone conducted case studies of a great number of institutions in order to reveal their collection styles, capacities, and needs. Her raw data from these case studies will be useful in my research of natural history museums and how their collection management systems are structured.

Hsu, T. (2012). A unified content and service management model for digital museums. *Journal Of Humanities & Arts Computing: A Journal Of Digital Humanities, 6*(1/2), 87-99.

This study provided the framework to structure a unified physical and virtual museum in terms of content and accessibility of the visitor/user. Hsu submits four concepts to center the unified museum model on: interdisciplinary content unification, value-added application connection, virtual-and-physical service integration, and social and community management.

Hsu's study and advocacy for unified knowledge-based content management systems (UKCM) aims to break the barriers set up between collections that form the "silo effect" that most natural history museums face. I will use this study as a resource in my project management action plan to centralize separate collections within natural history museums.

Lubar, S. (2015). Fifty Years of Collecting: Curatorial Philosophy at the National Museum of American History. *Federal History,* (7), 82-99.

In this article, Lubar enlightens the reader about the Smithsonian's National Museum of American History earliest practices surrounding collecting and curating as well as the philosophies of why and what they were collecting. Some of the earliest collections put an emphasis on collecting specimens and objects as they are found by collections curators and researchers on expeditions. This meant that most collections were comprised of the collector's personal interests based upon the research they were completing. The article spans a multiple decades (the 1960s to the 2000s) in the Smithsonian's collections and highlights the curators involvement and ultimately the criticisms they received in regards to their collecting styles.

This article is useful for my research on the history of natural history collections because it brings to light the separation of collections and collecting styles that is seen across scientific departments at natural history museums. The "silo effect" of separate collections for each scientific department stems from the fact that these separate collections at the Smithsonian were developed and managed by their singular curators of whichever science they were researching. Ultimately, the curators were blamed for poor collecting practices as they relate to access for museum staff, as well as the public, and collecting for the purposes of their personal research and not for the mission of the museum.

Marcum, D. (2014). Archives, libraries, museums: coming back together?. *Information & Culture, 49*(1), 74-89.

The digital age and reach of the internet is bringing collections across multiple institutions together in a collaborative effort to meet their missions. There is a request for informational institutions (archives, libraries, and museums) to work closely together, but it is noted that these institutions do not approach data descriptions, cataloguing, and object registration in the same way.

This article advocates the importance of collections management standards in order to streamline the collaboration that is needed across multiple institutions. It will prove to be much easier to combine collections research and data if every institution follows a standardized policy of records management.

Matassa, F. (2011). *Museum collections management : a handbook*. London : Facet Publishing.

In the first chapter of this book, the reader is introduced to a very brief detail of museum collections management throughout history around the world. Subsequent chapters focus on all aspects of collections management, including documentation, registration, and acquisitions. This source provides professional guidance on the care of collections, objects, and records.

I will use this resource in my project management plan to produce a set list of standardized fields which should be included for collection objects. This book is a set of "best practices," as developed by museum professionals over time, and can be used as a guide for records management.

Rogers, N. (2016). MUSEUM DRAWERS GO DIGITAL. *Science*, *352*(6287), 762-765. doi:10.1126/science.352.6287.762

Rogers' article begins by describing the overwhelming number of specimens in natural history collections. The author asserts that what the public sees of a museum's collection is usually only 1%, while 99% is hidden away in collection rooms inaccessible by all but the collection managers and curators. Because of this, museums are looking toward digitizing entire collections for accessibility and transparency of their collections procedures. The latest technology in photography and imaging software is streamlining the process of collection digitization for museums and institutions that can afford it, but problems still arise in the availability of specimen information and labels.

While reading this article, it is discovered that the specimen labels used for the digitization projects do not follow any regular format or layout of information, making the imaging software ineffective at selecting and digitizing the written information. I plan to use this source to argue the need for standardization of labels, and in a larger context, standardization of collections management systems between collections and departments in natural history museums that have decentralized collections management systems.

Samuel, E. K. (1988). Documenting our heritage. *Library trends, 37*(2), 142-153.

For the most part, museum collections began as resources for scientific research of specimens for their information and care, but in the earliest collections, "care" did not include documentation. Samuel addresses some problems that arose in museums with the lack of collection documentation that was widely seen around the 1970s, but also celebrates the early successes of museum collection catalogs, notably John Cotton Dana's Newark Public Library and Newark Museum initiative and Henry Watson Kent's New York Museum of Modern Art object catalog system.

This article highlights two pioneers in museum collection catalog systems, John Cotton Dana and Henry Watson Kent, both regarded as "museum masters," and demonstrates the similarities between museum and library cataloging. It is a good resource into the many trials, both successful and unrewarding, that museums have had in documenting their collections, both at natural history and art institutions. I will utilize this resource in my explanation of the history of natural history museum collection cataloging practices.

Schwarzer, M. (2006). *Riches, rivals & radicals: 100 years of museums in America*. Amer Alliance of
        Museums Press.

In a chapter from her book, Schwarzer references Henry Watson Kent and his iconic blue index card filing system taken from library stacks to museum collection rooms. The reader also learns that curators were the collections record keepers until World War II and were usually only interested in building their collections and accumulating more specimens instead of documenting what already existed in their collections. In the style of storytelling, Schwarzer personifies the history of American museum collections, their catalog systems, and the professionals that control and care for them.

This resource provides an introduction of the professional museum registrar in the 1950s and their importance to collections management and record keeping. I will use this resource to highlight the change from a curator-driven collection strategy to a registrars influence on the documentation and care of a museum's collection. This will be helpful to illustrate the evolution of collection management systems over the course of history at museums.

Srinivasan, R. S., Boast, R., Furner, J., & Becvar, K. M. (2009). Digital Museums and Diverse Cultural
        Knowledges: Moving Past the Traditional Catalog. *Information Society, 25*(4), 265-278.
        doi:10.1080/01972240903028714

This source, like others, speaks to the importance of a digital museum collection and its accessibility to the public. In it we find case studies of different institutions and the steps that were taken in order to unify their digital collections with their pre-existing physical collections and the challenges that arise during this course of action.

While reading this article I wondered if perhaps it is important to consider the identity and fundamental meaning of a collection before determining and implementing a collection management

plan and catalog system for that collection. This thought may give me additional guidance into determining collections management cataloging standards for my project management plan.

Sunderland, M. E. (2013). Feature: Computerizing natural history collections. *Endeavour, 37*(3), 150-161. doi:10.1016/j.endeavour.2013.04.001

Natural history museums and computer programming has proven to be a perfect match. Museums hold extensive amounts of raw object data that is ready to be input into computers and programs are ready to organize that data. Many types of computer collection processors have come onto the market over the past 50 years and Sunderland highlights a few in this article and their success and shortcomings in regards to several specific scientific organizations and museum collections.

This source focuses on a study of Berkley's Museum of Vertebrate Zoology and their history and experiences converting their collections catalog into computer databases. This case study and the successes of the museum's many trials in collection conversion can be utilized as a standard for other natural history museum collection to follow in the process of digitizing their records.

Swank, A. P. (2008). Collections Management System s. *Carlibrary.org*. p. 15.

Swank details the impact of the internet and digital age on museums and their collections, both for preservation of records and accessibility of information to the public. Noticing the importance of the internet and the opportunity to reach vast populations, museums began to create computer management systems in order to produce their collection catalogs online for public access.

I am interested in an aspect of this publication that notes Robert A. Baron's 1997 "standards" for collections management in order to streamline administrative duties as well as specimen data entry, such as object history loans, exhibitions, preservation, restoration, copyright, etc. It was my understanding from other research that there was not a set "standard" to collections management across all disciplines of museums and the different concentrations of collections. I will dive deeper into the bibliography of this source in order to find if this statement is true, and if so, how I can utilize these set standards for my project management plan.

Thomas, J. M. (2012). The documentation of the British Museum's natural history collections, 1760-1836. *Archives Of Natural History*, *39*(1), 111-125. doi:10.3366/anh.2012.0064

The history of catalog systems and record keeping styles of the British Museum's natural history collections between 1760 and 1836 is documented in extensive detail. Thomas follows multiple contributors to the collections records, and how their styles differed from the next.

Although this source focuses on an organization outside of the United States, I believe that it is still an important case study into the development of cataloguing and record keeping systems at a natural history museum. It is important to note that even within one institution, and in this case even within one collection, there can be many collecting and recording styles that can lead to confusion and inconsistencies. These problems can be solved with standardization of collections management.

Turner, H. (2015). Decolonizing Ethnographic Documentation: A Critical History of the Early Museum Catalogs at the Smithsonian's National Museum of Natural History. *Cataloging & Classification Quarterly*, *53*(5/6), 658. doi:10.1080/01639374.2015.1010112

The history of the catalog system at the Smithsonian's National Museum of Natural History through the eye of their Indigenous cultural collection is the focus of this article. The collecting style of the Smithsonian's collections is said to be "systematic" for field collectors (who were not always experts in or sensitive to the cultures they were collecting from) and streamlined for any collection, regardless of its provenance or cultural affiliation. Some view this as a troubling aspect of the Smithsonian's collecting history.

This source provides an insight into the importance of cultural sensitivity that must be given to certain museum collections. It is important to remember that some collections within natural history museum may have cultural specifications attached to them, which can affect the cataloguing and documenting of the objects within the collections. This would be a social justice aspect that can be added into a set of standards for collections management catalogs and databases.

APPENDIX B: STAKEHOLDERS

The following is a list of key stakeholders for the California Academy of Sciences Collection Management Unification Project.

California Academy of Sciences Registrar(s)

The Academy Senior and Associate Registrars are the primary stakeholders for the proposed project. These employees will cover the Project Manager roles during the entire course of the project.

California Academy of Sciences Collection Managers

The Collection Managers of each scientific collection department within the Academy will be utilized as resources during the development stages of the unified collection management system. Each Collection Manager will also be considered a primary stakeholder in this project. These employees will also be required to use the completed unified collection management system upon the culmination of the project. It is essential to have absolute buy-in from these stakeholders in order to regard the project as successful.

Collection Management System Vendor employed by the California Academy of Sciences

It is outside the scope of this project and report to appoint a specific collection management system to the California Academy of Sciences. However, it is assumed for the purposes of this report that a platform has been selected and is in use by the Academy for collection management across the entire institution. The vendor of the platform will be regarded as a project stakeholder.

Researchers and Scholars utilizing the California Academy of Sciences Collections

A successful outcome of this project will be beneficial to researchers and scholars that wish to utilize the Academy's collections for scientific or academic purposes. The centralized collection

management system for all scientific collections belonging to the Academy will provide researchers with a more streamlined approach to accessing the collections.

Similar Natural History Museums

Natural history museums around the world with similar problems with centralizing their collection management systems will be able to apply this project management plan to aid their development of unified systems.

Association of Registrars and Collections Specialists (ARCS)

One aspect of the ARCS mission statement is to "educate [Registrars and Collections Specialists] on the professional best practices of registration and collections care (ARCS, 2016)." ARCS will be regarded as a stakeholder for their potential to share the positive results of the unification project to likeminded Registrars and Collection Managers from other organizations.

American Alliance of Museums (AAM)

AAM as a society has advocated for the sharing of knowledge between museums since 1906, which includes sharing of standards and best practices. If a set of natural museum collection management standards can be established as a result of this project, the results should be shared among the AAM as a resource.

APPENDIX C: ORGANIZATIONAL HISTORY OF THE CALIFORNIA ACADEMY OF SCIENCES

A Brief Organizational History of the California Academy of Sciences

The mission of the Academy is to explore, explain and sustain life (California Academy of Sciences, 2016). Scientists in the Academy's laboratories and on expeditions throughout the world conduct research about natural elements, such as plants and animals, of our Earth as well as components which contribute to the conservation or destruction of those natural elements. Employees stationed in the Academy facility contribute to the portrayal of the researchers' findings through exhibitions, publications, special events, and educational programs. As the Academy's 990 Form states, the organization is "Using the resources of our aquarium, planetarium, natural history museum, and rainforest to chare scientific knowledge with the public (California Academy of Sciences, 2016)." The Academy groups their strategies into three categories: Science and Sustainability Education Programs, Public Engagement Programs and Exhibitions, and Biodiversity Science and Sustainability Programs. Each of these initiatives directly supports the Academy's mission.

The California Academy of Natural Sciences was founded in 1853 as a society conducting research on the resources of California State; just three years after California joined the United States. The society was renamed the California Academy of Sciences in 1868. Soon after, in 1874, the Academy opened its first physical museum space in San Francisco, California. The Academy soon outgrew its space at California and Dupont Streets (now Grant Avenue) and relocated to a larger facility on Market Street in 1891. The earthquake and ensuing fire of 1906 decimated the entire Market Street facility and Academy collection, with the exception of a very select few specimens from its collection. Fortunately, the Academy had launched an expedition to the Galapagos Islands just one year prior to the events of 1906, and researchers were able to return to San Francisco just a few months later with new specimens to begin rebuilding the Academy's collections. The Academy reopened its museum to San Francisco's

Golden Gate Park in 1916 with the North American Hall of Birds and Mammals. The Steinhart Aquarium

joined in 1923, followed by the Simson African Hall in 1934. The Science Hall and Morrison Planetarium

were added to the site in 1951 and 1952, respectively. The museum grew again in 1959, with the

Malliard Library, Eastwood Hall of Botany, and Livermore Room. Ten years later, in 1969, the Academy

opened a new building, Cowell Hall. Over the following centuries, new exhibition spaces and galleries

were opened, adding both space and delivered content. San Francisco was hit by another devastating

earthquake in 1989 which again damaged the Academy's facility. While some halls and exhibition spaces

remained open for some time, the decision was made to close the entire museum in 2005, demolish

what remained, and rebuild. Exhibits and staff were temporarily housed at a location on Howard Street

during the extensive construction of the "new" Academy.

The newest iteration of the Academy's' facility opened September 27, 2008. The facility was

designed by world renowned architect Renzo Piano to better reflect the Academy's devotion to

sustainability. Elements of the construction of the new facility, including recycled building materials, the

use of natural light throughout 90 percent of occupied spaces, and the buildings ability to recycle

resources contributed to the Academy's first LEED Platinum certification. The Academy later received its

second LEED Platinum certification for its sustainable operations.

The new facility houses a diverse range of collections, eight in total. These collections are as

follows: Anthropology, Aquatic Biology, Botany, Entomology, Herpetology, Ichthyology, Invertebrate

Zoology and Geology, and Ornithology and Mammalogy. One additional collection the Academy holds is

the Library. All collections and research departments reside within the Academy's Institute on

Biodiversity Science & Sustainability (IBSS). The Academy's operations are supported by multiple

departments, including the following: Senior Leadership Team (SLT), Executive Directors, Exhibits,

Human Resources, Business and Finance, Development, and Operations. Operations encompass all

elements of Experience Engineering, Information Technology, Facilities, Security, Guest Experience, and

Government Relations. The Academy's two final departments are titled Public Engagement & Education

and Brand, Marketing and Sales.

In fiscal year 2015, the Academy reported employing 806 individuals, with 780 recorded

volunteers. Its operational budget was just over $6,247,000, an impressive surplus considering the

previous year's deficit of nearly $17,346,000. A majority of the Academy's revenue comes from its

investment income while most of its expenses lie in salaries paid to employees.

A Brief Organizational History of the Exhibit Studio at the California Academy of Sciences

As the position of the Registrar of the California Academy of Sciences is housed within the

Exhibit Studio, it is worthwhile to introduce the organizational history of the department. A document

titled Public Engagement and Education Division Strategic Plan for the entire Academy was released in

2013 which detailed each department with the following information: personal mission statements for

each department, responsibilities, vision statements for the near future, guiding principles and core

values, goals, strategies, calendars, and how to measure success. In this way, the strategic information

for the Exhibit Studio exists; however this information is "under revision" and is considered inactive at

this time. This document was released when the Exhibit Studio was under management of a previous

department head. The department and its place within the Academy has since shifted, so the

information found in the 2013 Strategic Plan must be reconsidered and revised at some point. For the

purposes of this paper, the outdated information will be referenced.

The purpose of the Exhibit Studio, as quoted from the Strategic Plan, is as follows:

> The Exhibit Studio develops, designs, installs, evaluates, improves and
>
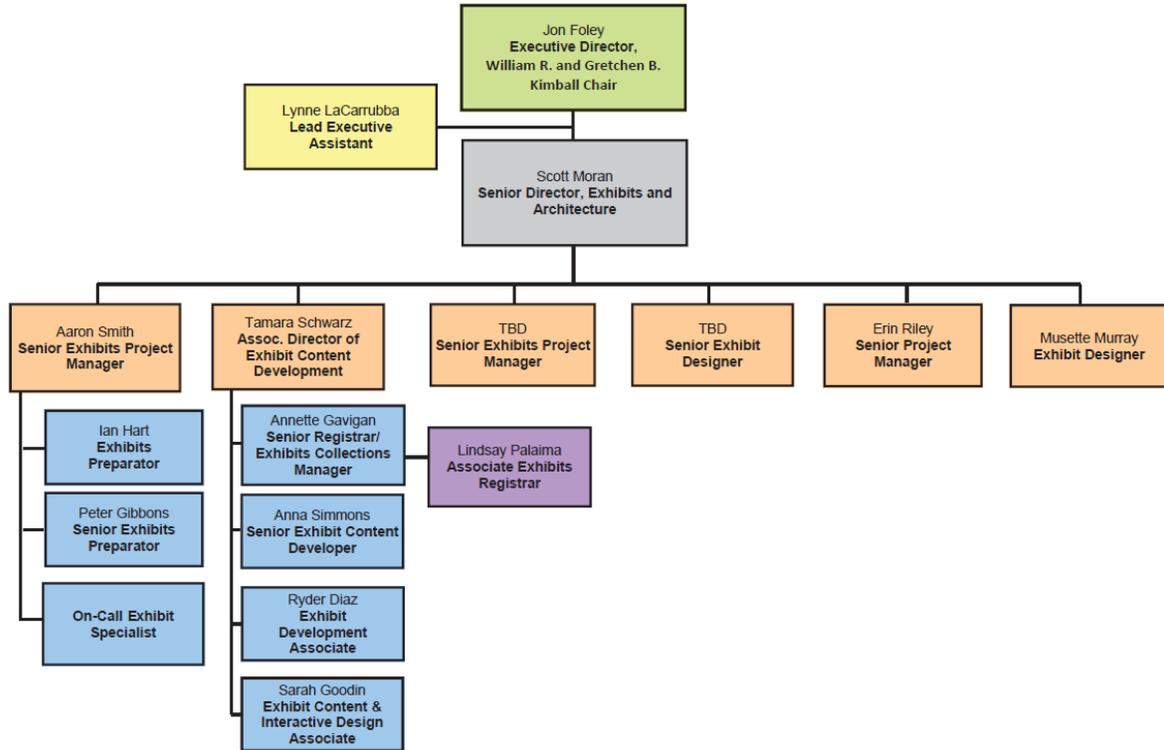> maintains all of the exhibits at the California Academy of Sciences, and

collaborates with other departments to maintain the aesthetics and

quality of all physical elements on the public floor and grounds.

The document then continues to describe specific roles and responsibilities that apply to the Exhibit

Studio, including, "Maintaining, enhancing or modifying existing exhibits", "Incorporating sustainable

practices into the design and production of our exhibits", and "Participating in conference and

professional groups to share our work and bring best practices and new approaches back to the

Academy." The mission statement mirrors the Academy's mission and reads as, "The Exhibit Studio

creates engaging and innovative exhibits that inspire wonder and appreciation for the natural world and

the encourage visitors to take action to sustain the diversity of life on Earth."

The Strategic Plan document accounts for 12.5 full-time employees within the Exhibit Studio.

The full-time employee positions include the following titles: Senior Director (Exhibits and Architecture),

Senior Exhibits Project Manager, Associate Director of Exhibit Content Development, Senior Exhibits

Project Manager, Senior Exhibit Designer, Exhibit Designer, Exhibits Preparator, Senior Registrar/Exhibits

Collections Manager, Exhibit Content Developer, Associate Exhibits Registrar, Exhibit Development

Associate, and Exhibit Content & Interactive Design Associate. The structure of the Exhibit Studio is

detailed in an Organizational Chart document, shown below (Figure 4). The department also relays on

volunteers and contracted Preparators and assigns specific duties to these individuals throughout the

course of department projects.

California Academy of Sciences - Organizational Chart

Exhibits

Jon Foley
**Executive Director,
William R. and Gretchen B.
Kimball Chair**

Lynne LaCarrubba
**Lead Executive
Assistant**

Scott Moran
**Senior Director, Exhibits and
Architecture**

Aaron Smith
**Senior Exhibits Project
Manager**

Tamara Schwarz
**Assoc. Director of
Exhibit Content
Development**

TBD
**Senior Exhibits Project
Manager**

TBD
**Senior Exhibit
Designer**

Erin Riley
**Senior Project
Manager**

Musette Murray
Exhibit Designer

Ian Hart
**Exhibits
Preparator**

Peter Gibbons
**Senior Exhibits
Preparator**

**On-Call Exhibit
Specialist**

Annette Gavigan
**Senior Registrar/
Exhibits Collections
Manager**

Anna Simmons
**Senior Exhibit Content
Developer**

Ryder Diaz
**Exhibit
Development
Associate**

Sarah Goodin
**Exhibit Content &
Interactive Design
Associate**

Lindsay Palaima
**Associate Exhibits
Registrar**

08/2016

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Figure 4. Exhibit Studio Department Organizational Chart, California Academy of Sciences

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APPENDIX D: GANTT CHART FOR PROJECT MANAGEMENT PLAN
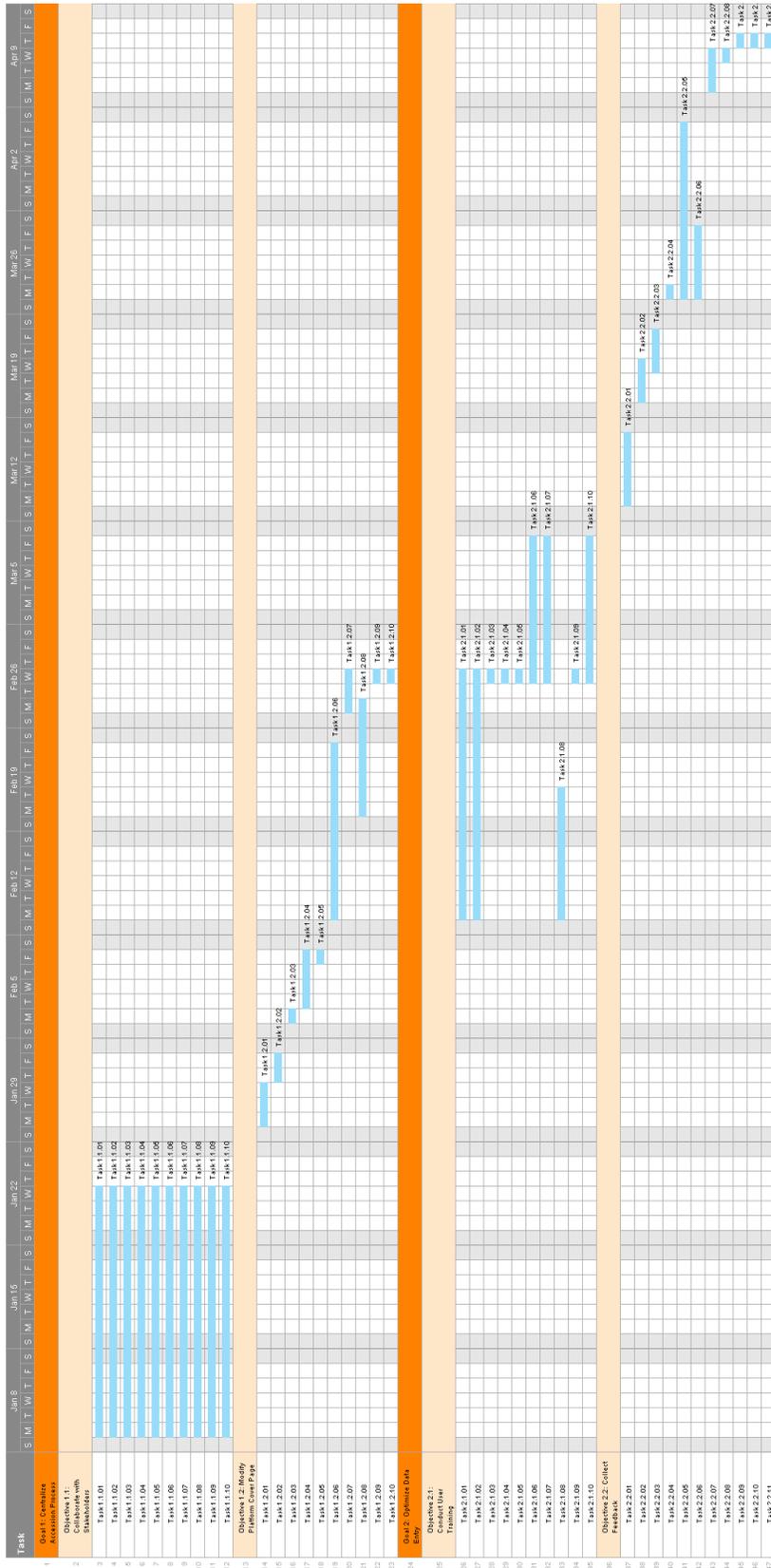
APPENDIX E: ACTION PLAN MILESTONE WORKSHEET

Task	Task Detail	Start Date	Due Date	Complete (Y/N)	Assigned To	Status	Comments
Goal 1: Centralize Accession Process							
Objective 1.1: Collaborate with Stakeholders							
Task 1.1.01	Conduct meeting with Collection Manager of the Anthropology Department to view current Collection Management System	01/09/17	01/25/17		Project Manager, Collection Manager - Anthropology	Not Started	
Task 1.1.02	Conduct meeting with Collection Manager of the Aquatic Biology Department to view current Collection Management System	01/09/17	01/25/17		Project Manager, Chair - Emeritus	Not Started	
Task 1.1.03	Conduct meeting with Collection Manager of the Botany Department to view current Collection Management System	01/09/17	01/25/17		Project Manager, Senior Collections Manager - Botany	Not Started	
Task 1.1.04	Conduct meeting with Collection Manager of the Entomology Department to view current Collection Management System	01/09/17	01/25/17		Project Manager, Collection Manager - Entomology	Not Started	
Task 1.1.05	Conduct meeting with Collection Manager of the Herpetology Department to view current Collection Management System	01/09/17	01/25/17		Project Manager, Senior Collections Manager - Herpetology	Not Started	
Task 1.1.06	Conduct meeting with Collection Manager of the Ichthyology Department to view current Collection Management System	01/09/17	01/25/17		Project Manager, Collection Manager - Ichthyology	Not Started	
Task 1.1.07	Conduct meeting with Collection Manager of the Invertebrate Zoology Department to view current Collection Management System	01/09/17	01/25/17		Project Manager, Collection Manager - Invertebrate Zoology	Not Started	
Task 1.1.08	Conduct meeting with Collection Manager of the Geology Department to view current Collection Management System	01/09/17	01/25/17		Project Manager, Collection Manager - Geology	Not Started	
Task 1.1.09	Conduct meeting with Collection Manager of the Ornithology & Mammalogy Department to view current Collection Management System	01/09/17	01/25/17		Project Manager, Collections Manager - Birds and Mammals	Not Started	
Task 1.1.10	Conduct meeting with Collection Manager of the Library Department to view current Collection Management System	01/09/17	01/25/17		Project Manager, Academy Archivist	Not Started	
Objective 1.2: Modify Platform Cover Page							
Task 1.2.01	Produce lists of collections management system information collected in Objective 1.1	01/30/17	02/01/17		Project Manager	Not Started	
Task 1.2.02	Compare lists; extract record fields that are universal across departments	02/02/17	02/03/17		Project Manager	Not Started	
Task 1.2.03	Conference with Senior Registrar to determine final fields to include in cover page layout	02/06/17	02/06/17		Project Manager, Senior Registrar	Not Started	
Task 1.2.04	Create mockup of centralized cover page	02/07/17	02/10/17		Project Manager, Senior Registrar	Not Started	
Task 1.2.05	Send changes to database platform representative for production	02/10/17	02/10/17		Project Manager	Not Started	
Task 1.2.06	Database platform redesigns cover page based on changes sent by PM	02/13/17	02/24/17		Outside Company Representative	Not Started	
Task 1.2.07	Once design is complete and returned from platform representative, test functionality of entire database	02/27/17	03/01/17		Project Manager	Not Started	
Task 1.2.08	Create user profiles for each Collection Manager	02/20/17	02/27/17		Project Manager, Outside Company Representative	Not Started	
Task 1.2.09	Distribute login information to Collection Managers	03/01/17	03/01/17		Project Manager	Not Started	
Task 1.2.10	Launch cover page for use	03/01/17	03/01/17		Project Manager	Not Started	
Goal 2: Optimize Data Entry							
Objective 2.1: Conduct User Training							
Task 2.1.01	Produce guide to assist users in basic database functions	02/13/17	03/01/17		Project Manager	Not Started	
Task 2.1.02	Develop sample record creation/modification tasks for users to complete during training	02/13/17	03/01/17		Project Manager	Not Started	
Task 2.1.03	Present user guide and sample task report to Senior Registrar for final approval	03/01/17	03/01/17		Project Manager, Senior Registrar	Not Started	
Task 2.1.04	Conference with Collection Managers to discuss implementation of new database system, user training, sample record creation, and feedback surveys	03/01/17	03/01/17		Project Manager, Senior Registrar, Collection Managers	Not Started	
Task 2.1.05	Distribute user guide and sample tasks to stakeholders	03/01/17	03/01/17		Project Manager	Not Started	
Task 2.1.06	Complete basic user training	03/01/17	03/10/17		Collection Managers	Not Started	
Task 2.1.07	Complete sample record creation	03/01/17	03/10/17		Collection Managers	Not Started	
Task 2.1.08	Create user feedback survey	02/13/17	02/21/17		Project Manager	Not Started	
Task 2.1.09	Distribute user feedback surveys	03/01/17	03/01/17		Project Manager	Not Started	
Task 2.1.10	Complete feedback surveys	03/01/17	03/10/17		Collection Managers	Not Started	
Objective 2.2: Collect Feedback							
Task 2.2.01	Collect and review user feedback surveys	03/13/17	03/17/17		Project Manager	Not Started	
Task 2.2.02	Prioritize comments and opinions about page layouts and entry fields	03/20/17	03/22/17		Project Manager	Not Started	
Task 2.2.03	Incorporate changes with top priority to cover page (and subsequent discipline pages)	03/22/17	03/24/17		Project Manager	Not Started	
Task 2.2.04	Send changes to database platform representative for production	03/27/17	03/27/17		Project Manager	Not Started	
Task 2.2.05	Database platform redesigns based on changes sent by PM	03/27/17	04/07/17		Outside Company Representative	Not Started	
Task 2.2.06	Create new user guide for redesigned layout	03/27/17	03/31/17		Project Manager	Not Started	
Task 2.2.07	Once design is complete and returned from platform representative, test functionality of entire database	04/10/17	04/12/17		Project Manager	Not Started	
Task 2.2.08	Present user guide and sample task report to Senior Registrar for final approval	04/12/17	04/12/17		Project Manager, Senior Registrar	Not Started	
Task 2.2.09	Distribute new user guide to stakeholders	04/13/17	04/13/17		Project Manager	Not Started	
Task 2.2.10	Launch new cover page with incorporated user feedback	04/13/17	04/13/17		Project Manager	Not Started	
Task 2.2.11	Redistribute feedback surveys and respond to comments as needed	04/13/17	Ongoing		Project Manager	Not Started	

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