

Academy of Natural Sciences of Drexel University



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DAM System Implementation Plan

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About the Academy

The Academy of Natural Sciences of Drexel University (“The Academy”) is America’s oldest natural history museum, currently located in the heart of Philadelphia’s cultural district. Founded in 1812, the Academy is “...a prestigious, leading natural history museum dedicated to advancing research, education, and public engagement in biodiversity and environmental science” (Academy of Natural Sciences, 2014a, footer). The Academy’s rich heritage and historical significance in relation to the development of scientific inquiry in America is captured within the following statement: “The Academy’s history mirrors the evolution of the relationship between the American people and the natural world. The oldest natural sciences institution in the Western Hemisphere, the Academy was founded when the United States hugged the Atlantic coastline and Philadelphia was the cultural, commercial, and scientific center of the new nation” (Academy of Natural Sciences, 2014b, para. 2).

The Academy has since enjoyed continual growth in research, programs, collections, and facilities. It is home to millions of objects, media, and documents collected and curated through various departments:

- **Center for Systematic Biology and Evolution (CSBE):** The CSBE houses a renowned collection of over 17 million plant and animal specimens which inform research on topics of biodiversity, ecology, evolution, molecular systematics, and paleontology. Several departments, including Malacology, Entomology, Ornithology, Ichthyology, and the Diatom Herbarium, are actively involved in mass digitization projects (Academy of Natural Sciences, 2014d).
- **Library & Archives:** the Ewell Sale Stewart Library holds more than 250,000 titles published from 1520 to present. Two-thirds of all titles predate the 20th century, and many of them are rare and unique (Academy of Natural Sciences, 2014e). The Academy Archives provide stewardship of over 2,000 archival collections, constituting over one million items from the late 17th century to present (Academy of Natural Sciences, 2014e). Additionally, over 20,000 library and archival objects have been digitized and made accessible through a web based digital collection (Academy of Natural Sciences, 2012b).
- **Marketing:** the Academy’s Marketing department staff manage the creation of museum related advertising and promotional material for distribution through multiple media channels with the goal of increasing global awareness of the Academy brand.
- **Communications (PR):** the Communications department staff create and distribute public relations materials to external audiences.
- **Institutional Advancement (IA):** staff within the Institutional Advancement department are responsible for the creation and distribution of Academy publications such as annual reports and *Frontiers*, the Academy’s monthly member magazine.
- **Web Services:** the Academy’s Web Manager creates and manages web content using the Sitecore CMS system (E. Willis and M. Hartsock, personal communication, November 19-24, 2014).

In 2011, the Academy became affiliated with Drexel University, resulting in a strategic alliance that promises to enable continued sustainability and growth into the future (Academy of Natural Sciences,

2014c, para. 2). The following year saw the beginning of a five year strategic plan, with a major goal being to “Optimize stewardship, growth, and availability of the Academy’s collections in all their forms so that these unique resources can promote discovery and become ever more central to research, teaching, and exhibition” (Academy of Natural Sciences, 2012a, p. 8). To achieve this goal, the following strategic objective is outlined within the plan (with selected action steps highlighted below):

- *“Develop a plan for the capture, management, and preservation of digital data.*
 - Explore the emerging role of digital data, especially images, in research and education
 - Identify biological and archival collections that have been digitized. Prioritize those requiring additional processing for access, as well as additional collections for which digital access will be valuable to research, teaching, or revenue generation. Develop plan to curate digital surrogates to the ANS collections of highest priority
 - Establish an Office of Image Resources and Intellectual Property Rights to promote revenue-generation from digital collections assets
 - Identify the funding possibilities for “big-data” projects, including exploration of the planning underway at Drexel to establish a university-wide infrastructure for curating and preserving digital assets” (p. 8).

This objective evidences the Academy’s long term commitment to identifying, managing, and leveraging its digital assets for the purposes of expanding research, education, and revenue opportunities.

Three years after its bicentennial, the Academy and its collections are well positioned for continued growth. To meet this strategic goal, it is imperative to formulate an ongoing organizational-wide digital strategy which is both sustainable in the present and scalable for the future. As part of this strategy, the implementation of an enterprise level digital asset management (DAM) system is critical to enable the effective capture, storage, management, distribution, and preservation of the Academy’s vast cultural capital.

Project Scope

The implementation of a DAM system is a complex endeavor for any organization. The planning, procurement, configuration, integration, and ongoing governance of a DAM system requires a comprehensive analysis of the people, processes, information, and technologies employed to manage digital assets and related data throughout an organization—an exercise which typically requires the involvement of almost every functional area or department.

When implementing a DAM, best practices dictate a phased rollout along with continuous evaluation and feedback from users. As seen in Table 1 below, the departments chosen for Phase II pilot implementation are Marketing/Communications, Institutional Advancement, and Web Management. With the least amount of digital assets, a high need for workflow automation and system integration, and the greatest potential for creation of a new revenue stream through digital image licensing, these departments were identified as the most likely to produce the quickest return on investment (ROI). The estimated duration for each stage is dependent upon the level of resources allocated; the amount of staff, budget, time, and resources available will dictate the possibility of compressing the timetable for the subsequent rollouts to other departments within the Academy and Drexel University.

Table 1: DAM implementation rollout plan

Phase	Duration	Objective	Departments
I	6–9 mths	Planning	All
II	1 year	Pilot	<ul style="list-style-type: none"> • Marketing/Communications (PR) • Institutional Advancement • Web Services
III	2 years	Planning & rollout	<ul style="list-style-type: none"> • Curatorial departments (Pilots: Malacology, Entomology, Ornithology, Ichthyology, Diatom Herbarium)
IV	1½ years	Planning & rollout	<ul style="list-style-type: none"> • Ewell Sale Stewart Library • Academy Archives
V	1½ years	Planning & rollout	<ul style="list-style-type: none"> • Drexel University Libraries

This DAM Implementation Plan details the initial Phase I planning stage in preparation for the Phase II pilot rollout to the Marketing/Communications, Institutional Advancement, and Web Services departments. Due to the need for specialized metadata management and information architecture among the various museum constituencies, staff within these three departments will share access to the same catalog within the DAM that is configured for their specific use cases. Additional catalogs for the curatorial departments and the library/archives will be created, maintained, and administered separately during subsequent rollout phases. The rollout to Drexel University would require a separate database instance in order to maintain complete data independence.

DAM System Implementation Goals

Business objectives

The main objectives of the pilot implementation for the Marketing/Communications, Institutional Advancement, and Web Management departments are to:

- Identify, centralize, and provide easy access to digital assets for reuse
- Facilitate greater brand consistency across all communication channels
- Enable efficient multi-channel, global distribution of digital assets
- Provide asset-level data for marketing and public relations campaign analysis
- Realize increased production efficiencies through system integration and workflow automation
- Support new revenue streams through commercial licensing of digital assets to stock media companies (Art Resource, Bridgeman Art Library, Corbis, Getty Images)
- Increase compliance with asset licensing terms and reduce liabilities from potential infringements
- Provide secure storage and increased security for the departments' digital assets
- Support an institutional-wide digital preservation strategy

Use cases

It is common practice for DAM industry analysts to classify typical DAM usage scenarios. These scenarios can be helpful in identifying overarching project goals as well as in identifying vendor products that may be designed as a solution for these specific use cases. The primary use case for the pilot departments can be represented by a combination of the “Basic brand management” and “Marketing asset and distribution” categories used by The Real Story Group, a popular industry analyst firm:

- **Basic Brand Management:** the DAM system is used by marketing and communications departments as a brand library to store finalized marketing and brand content. “Simple brand management requires basic metadata support, basic packaged transformations to provide approved renditions for various media, security to control asset access and visibility, and a simple folder structure to facilitate navigation and search across brands” (Regli, 2009, p. 23).
- **Distribution:** the DAM serves as the central repository for material that needs to be distributed directly “...to internal and external stakeholders, either directly as DAM system users, or indirectly through a portal, website, or other distribution application” (Regli, 2009, p. 24).

Content Inventory

A detailed content inventory was not able to be undertaken for this project; however, the following types of assets and file formats commonly used in marketing and creative workflows appears below (Table 3). Although it was not possible to obtain an estimate of the total number of digital assets stored by the pilot departments, considering the Academy’s tenure, the volume is likely to be quite considerable.

Table 3: Pilot department asset inventory

Asset type	Usage	Source	Formats
Images (hi-res)	Print ads/promos: <ul style="list-style-type: none"> ▪ Brochures ▪ Mailers ▪ Posters ▪ Publications ▪ Signage ▪ Maps 	<ul style="list-style-type: none"> • Web manager • Staff graphic designer • Graphic design agency • Hired professional photographers • Library/Archives • Curatorial staff • Stock photo houses 	.tiff, .eps, .bmp, raw formats
Images (low-res)	ANSP website	<ul style="list-style-type: none"> • Web manager • Stock photo houses 	.png, .jpg, .gif
Audio	Interviews, podcasts	<ul style="list-style-type: none"> • Web manager 	.avi, .mp3, .wav, .wma, .aiff
Video (clips)	Advertising, promo spots	<ul style="list-style-type: none"> • Video production studio • Web manager 	Containers: .avi, .mpg, .mp4, .mov, .wmv, .swf, .flv
Video (long form)	TV commercials, documentaries	<ul style="list-style-type: none"> • Video production studio 	Codecs: mpeg-4, H.264, wmv, quicktime, mov, rm, swf
Graphics	Logos, illustrations, page layouts	<ul style="list-style-type: none"> • Staff graphic designer • Graphic design agency 	.ai, .psd, .indd, .imdl, .pdf
Text	Annual reports, museum	<ul style="list-style-type: none"> • Staff graphic designer 	.doc/.docx, .ppt/.pptx,

	publications	<ul style="list-style-type: none"> • Graphic design agency • Mktg/Comm dept. • IA dept. 	.xlx/.xlsx, .txt, .rtf, .pdf
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Workflow Analysis

Workflows within the Marketing/Communications and Institutional Advancement departments were analyzed for this project (workflow for the Web Services department was not able to be determined). Based on stakeholder interviews, current workflows were determined to be relatively linear:

- **Marketing:** marketing staff produce advertising for multiple channels (print, web, and broadcast) in coordination with an external graphic design agency and video production studio.
 - **Print/web ads:** visual assets (images and graphics) are sourced from in-house photographers, professional photographers, and stock photo houses, and delivered to the graphic design agency using Dropbox. Brand assets (logos) are available to marketing staff via the museum intranet. Marketing staff review and edit designs with the agency using Basecamp project management software. Once the designs are finalized and approved by the Marketing Director, the final assets are delivered back to marketing staff via Dropbox. The final assets are then archived on a dedicated shared drive.
 - **Broadcast ads:** video assets (clips and long form) are created and produced by a local external video production studio. Once the Marketing Director approves the videos, final video clips are sent back to marketing staff via Dropbox, and archived on a dedicated media drive. Final long form video is stored by the video production company.
- **Communications (PR):** workflow for this department was not able to be determined; however, a “Press Room” is available on the ANSP website which is used as a distribution portal for high resolution publicity photographs (E. Willis, personal communication, November 19, 2014).
- **Institutional Advancement (IA):** IA staff produce print publications (annual reports and *Frontiers*, the Academy’s monthly membership magazine) in coordination with an in-house graphic designer and professional printing company. Most images are sourced from in-house and professional photographers, along with the occasional use of stock photos. Brand assets (logos) are available to marketing staff via the Academy’s intranet. Graphics and publication layouts are created by the graphic designer, approved by department managers, and then delivered electronically to the printer. Final files are returned to IA staff and stored on the dedicated media server (M. Hartsock, personal communication, November 19, 2014).
- **Web Services:** workflow for this department was not able to be determined; however it is known that Sitecore, the content management system used by the Academy, is also used by Drexel University staff. Additionally, the Web Services department maintains a Facebook gallery which contains low-resolution images for browsing. These images do not contain embedded metadata (M. Hartsock, personal communication, November 19, 2014).

Workflow automation

The use of a DAM system will bring many efficiencies to current workflows through the ability to automate repetitive, time consuming content management tasks. With consistent application of

strategic metadata to assets within the DAM, staff will see significant productivity gains as the following processes become quicker and cheaper as measured in staff time:

- Search and retrieval of assets
- Determining assets' copyright status and tracking licensing terms
- Managing asset versions, variations, and renditions
- Trafficking assets for approvals
- Repurposing images/graphics and transcoding video
- Tracking asset usage for marketing/publicity/publication usage
- Distributing assets to internal and external parties across multiple channels

The process of adding metadata to assets in the DAM will be automated in a number of ways to minimize the amount of manual labor involved. Upon ingest, the DAM system will leverage Adobe's XMP standard to automatically extract descriptive, structural, technical, and administrative metadata that has been embedded within assets derived from creative applications (Adobe Creative Suite, Adobe Bridge, etc.) as well as capture devices such as cameras and scanners. The DAM system may also be able to extract metadata from asset filenames, directory structures, and "hot folders" during the upload process. Once in the DAM system, metadata can be entered or edited in bulk for assets that share the same characteristics. Staff will be able to add assets to multiple virtual galleries, increasing asset findability and reducing the time spent searching for content.

During the production phase of an asset's lifecycle, the DAM system will be configured to notify users of changes made to assets, eliminating the need for repeated communication among staff who might be waiting on approvals in order to repurpose or distribute content. Important dates (embargoes, license expirations, etc.) will be tracked as well, reducing the possibility of rights infringement and eliminating the time spent tracking down rights information after potentially costly errors have been made.

Staff will see considerable time and resource savings by using the DAM as a central hub for distributing in-process and final assets to both internal and external parties. A web portal will be branded and customized for the purpose of enabling internal staff and external vendors and partners to retrieve content at the time of need and in the format required for their purposes. Users will be able to browse, search, and retrieve assets within a variety of formats for immediate download, save assets to personalized web galleries, and share secure links to assets for distribution through social channels.

DAM system requirements

The content inventory, use cases, and workflow analysis discussed above indicate the need for relatively basic features that would be commonly found within most modern marketing oriented DAM systems. However, system requirements in this case must take into account the future onboarding of the Curatorial and Library & Archives departments, which present different use cases that demand more nuanced metadata modeling, support for multiple hierarchical controlled vocabularies, and scalability in a number of areas as recommended by Windsor (2013) and Diamond (2013).

In addition to enterprise scalability, the potential DAM vendor must support a cloud-based delivery model and a proprietary or hybrid software licensing model. Because the Academy currently lacks the data storage infrastructure and technology staff to support an enterprise level on-premise implementation (regardless of the software licensing model), a proprietary Software-as-a-Service (SaaS) solution is ideal. Lawrence (2014) describes the SaaS delivery model:

“In a SaaS DAM solution, the vendor manages the hardware, software, database, storage and security of your assets through a subscription model. It’s a pay as you go model that allows the client to purchase as little or as much services as needed. The client has the ability to make limited configurations, set permission levels and access rights for users and assets. Additionally, the client can create workflows for managing and distributing assets” (para. 4).

The SaaS model aligns well with the proposed phased implementation plan since the initial volume of storage required will be relatively small. Diamond (2012) lists additional benefits of the SaaS delivery model, including relatively quick and easy startup, modern system architecture, and fast software updates. Additionally, IT staff are not burdened with managing the DAM software.

Integrations with existing content management solutions would offer even more efficiencies in asset distribution. Ideally, the chosen DAM system will be integrated with Dropbox so that staff can continue using this file sharing system, but with the added benefit of syndication through the DAM system. Because staff at the Academy and Drexel University utilize the Sitecore content management system (CMS), the DAM system should offer a direct integration or a web services API to enable the DAM and CMS to share assets and metadata. This will enable the automated publishing of assets to the Academy’s web site as well as automated metadata exchange between the two systems. Designers will benefit from integration with Adobe products as well, since assets can be inserted directly from the DAM into creative applications. Although the Academy does not currently use an organizational-wide collection management system, an API would enable future integration among this system and the DAM, should the Academy wish to adopt one.

To support these factors and user needs, the following functionality should be listed as required within the RFI/RFP:

Table 2: DAM system functional requirements

Functional area	Requirements
Hosting model	<ul style="list-style-type: none"> • SaaS (Cloud)
Software licensing model	<ul style="list-style-type: none"> • Proprietary or hybrid
Client access	<ul style="list-style-type: none"> • Web client • Mobile client
Enterprise architecture	<ul style="list-style-type: none"> • Non-proprietary relational or NoSQL database technology • Service oriented architecture (SOA) compliant • 100% multi-tenant and multi-instance support
Data storage	<ul style="list-style-type: none"> • Redundancy • Backups • Disaster recovery plans/procedures • Modular storage capabilities
Data security	<ul style="list-style-type: none"> • Secure user login and file transfer • External user authentication • Granular permissions based on users and groups • Asset audit trails • Metadata validation • Data integrity checks

Integrations	<ul style="list-style-type: none"> • Web services API (REST/SOAP) • Potential direct integrations with: Sitecore (Web CMS), Dropbox, Collection management system, and ILS
Asset handling	<ul style="list-style-type: none"> • Support for asset formats used (Table 2) • Image format conversions and basic video transcoding • Support for compound asset linking • Basic asset manipulation within the DAM (rotating, flipping, etc.) • Version control (files and metadata)
Workflow automation	<ul style="list-style-type: none"> • Support for multiple workflows • Support for multiple authorization steps within one workflow • Batch import/export operations • Notification and approvals when assets are added, updated, or deleted • Rules based workflows (public release, embargoes, etc.)
Metadata support	<ul style="list-style-type: none"> • Support for EXIF, IPTC, and XMP standards • Ability to read and write XMP metadata to and from assets • Ability to export metadata in XML format • Support for hierarchical metadata schemes • Adaptive/customizable metadata schemes based on classes • Unlimited custom metadata fields • Automatic metadata templates • Batch metadata operations (editing, copying, replacing, and appending) • Metadata audit trails
Controlled vocabulary support	<ul style="list-style-type: none"> • Support for multiple hierarchical taxonomies • Thesaurus import/integration
Search features	<ul style="list-style-type: none"> • Faceted search filtering • User defined search filters and sorting options • Full text search • Linked asset search • Autocomplete • Spellcheck
User interface	<ul style="list-style-type: none"> • Configurable web client interface • Ability to customize/brand interface for different types of users • User-created web galleries/lightboxes
Analytics	<ul style="list-style-type: none"> • System, user, and asset level
Rights management controls	<ul style="list-style-type: none"> • Watermarking • Ability to restrict downloads • Ability to link images (licenses) to other assets • Ability to require mandatory metadata upon asset ingest
Vendor	<ul style="list-style-type: none"> • Training provided for administrators and end users • Training for in-house IT support • Product roadmap (next 2 yrs., next 2 quarters, 5 year vision) • Client references (museums with similar volume of assets) • Documentation

Metadata model

The display of metadata within a DAM needs to be carefully considered, as users may become frustrated when presented with too many irrelevant metadata fields. Because the Academy’s DAM system will need to support a variety of use cases, the ability to create flexible metadata models is highly desirable. With flexible, “adaptive” metadata modeling, assets can be assigned to categories, resulting in the display of a unique set of related fields that only appear for assets when tagged with that category. Some DAM systems allow the assignment of multiple categories or classes that can be added to an asset throughout its lifecycle. In this case, when users assign a category to an asset, relevant fields are then displayed. This eliminates the need to use one schema for all assets—a practice which typically results in an abundance of unused fields that clutter up the user interface and often confuse users, negatively impacting user adoption.

Specific metadata fields modeled for the pilot implementation are listed in Appendix A. Basic descriptive metadata is recorded and displayed for all assets to enable federated search across the collection. Additional technical metadata is included for asset types indicated within the content inventory, as well as metadata for the purpose of enabling digital workflows, rights management, and digital preservation. Initial metadata schemas will be classified by asset type, with additional categories such as campaign types, copyright status, workflow status, and approval status defined based on the chosen systems’ support of this functionality. Controlled pick-lists will be used for as many fields as possible to promote consistent, standardized asset cataloging.

As detailed in the data dictionary (Appendix A), twenty-seven core metadata fields will be mandatory and displayed for all assets, of which a maximum of twenty will require manual data entry throughout an asset’s lifecycle:

Title	Creator application
Creator	Filename
Creator role	File size
Status	File format
Keywords	Orientation
Description	Identifier
Collections	Contact
Publisher	Department
Event	Date created
Exhibit	Copyright status
Location	Expiration date
Program	Release date
Publication	Credit line
Media type	

Information architecture

User experience is a critical component of the design of an information system—especially for users who may not be familiar with content management systems. The ease with which users are able to access, navigate, and use a DAM system will directly impact user adoption and ultimately determine in large part the success or failure of a DAM system implementation. The Academy’s DAM system will be

carefully architected in close consultation with all potential users to design a user experience that accommodates those users' information seeking needs.

Asset display

Assets will be displayed as proxy images, with the ability to customize the layout and size of image previews within web galleries. To assist with asset viewing and cataloging, the DAM system will provide the ability to zoom in on images and perform side-by-side comparisons of two or more image proxies. Features for routine operations such as asset transformations, application of internal ratings, social sharing, and metadata editing will be available and easily accessible within each asset's individual display. Ideally, users will be able to edit, copy, append, and delete metadata via commands available at the individual asset level.

Taxonomy

Taxonomies play a critical role in both known-item and exploratory searches. Often, users do not know or remember the exact characteristics of an asset they are looking for such as the title or creator name, but they may be able to recall the year it was published or for which advertising campaign it was used. The Academy's DAM system will feature a hierarchical taxonomy (attached) that can be implemented as nested folders, consistent with the navigational scheme of familiar computer operating systems.

Following the pilot implementation, the proposed taxonomy will be expanded for use across the Academy. Subsequent rollouts to the curatorial and library/archive departments (phases 3 & 4) will also leverage this enterprise taxonomy within their separate DAM catalogs, as well as other content management systems used within the museum.

Currently, staff within the pilot departments locate assets by browsing through hierarchical folders on a shared media server which is organized first by year, then by subject area. The proposed taxonomy contains these facets as well as additional facets that will enable users to browse for assets within the following broad categories:

Assets	Activities
People	Media
Roles	Concepts
Locations	Subject/Keywords
Galleries	Departments
Exhibits	Campaigns
Programs	Projects
Events	Year (of release)
Actions	Copyright status

Search and retrieval

The Academy's chosen DAM system will feature sophisticated search functionality, including basic and advanced search interfaces. The advanced search interface will utilize available cataloging criteria as filters, and provide users with the ability to sort search results by a number of facets and to save custom searches. Ideally, advanced search functionality will include support for linked asset searches and the ability to search subsets of search results. A spellcheck feature will be included both as an aid to retrieval and to help ensure data integrity during asset cataloging.

Faceted search capabilities will provide users with the ability to filter their searches by multiple asset attributes. Depending on the DAM system, facets may be implemented as part of a faceted

navigation system or presented as options to refine search results. Facets will be based on the proposed taxonomy as well as additional attributes deemed important for retrieval.

In order to enable consistent and efficient keyword indexing, the DAM system will either integrate with thesaurus management software or support the ability to import custom hierarchical keywords to enable granular subject access. This will make catalogers' lives easier and provide a more intuitive and efficient browsing experience for users. The keyword thesaurus will be based on the organization-wide taxonomy. Related terms (and possibly related assets) will be integrated with the DAM system's search engine module to provide users with predictive search (also known as "type-ahead/auto-complete") functionality and automatic inclusion of synonyms.

The combination of structured folder browsing, faceted search, and hierarchical keywords will provide users with highly granular search options, enabling them to quickly browse or search for assets using a number of different criteria that can be combined to form efficient and effective search queries. System architecture will be continuously evaluated and informed by user testing and feedback.

Information governance

Because the structure, content, and information management needs of organizations change over time, so too must the organization of information within the DAM. In order for the DAM system to continue meeting user needs over time, information governance must be prioritized and realized as an ongoing commitment. Interviewing and surveying users and reviewing DAM system statistics such as system usage, asset usage, and search logs will go a long way towards determining how users currently utilize the DAM and what their ongoing needs are.

Information governance also includes education for those responsible for editing and managing metadata and controlled vocabularies. As part of the implementation plan, an online wiki-based cataloging guide will be created that includes a data dictionary and documentation of the controlled vocabularies in use. An informal group or formal committee will be formed to manage the process of updating the system's information architecture based on input from users and stakeholders.

Digital rights management

Staff within the pilot departments frequently license media from stock agencies and professional photographers (E. Willis, personal communication, November 19, 2014). Currently, the intellectual property rights and licensing permissions for images are tracked through sidecar documentation included within a folder designated for each asset on the Academy's shared media drive. Photographer contracts are handled through Drexel University, so Academy staff do not have easy access to the actual licensing terms.

Limited information related to intellectual property owners can be accessed by opening up the sidecar document for each asset that a user may want to use. Staff do not currently have an efficient mechanism in place for searching across their collection of assets to determine copyright status, licensing terms, and contact information for intellectual property holders. Having this information available at users' fingertips within a DAM system would not only reduce liability from potential infringements, but also protect future revenue streams through the efficient management, tracking, and enforcement of the Academy's own intellectual property rights for assets that may be licensed and distributed to stock agencies and other organizations. The chosen DAM system will thus provide a much needed basic digital rights management (DRM) solution for the Academy's various departments.

DRM strategies

Wolfe (2013) outlined strategies for managing the complex parameters involved in licensing rights managed photography and media, including strategic restriction of access to assets within a DAM, and education for users on the topics of copyright, licensing, and where to find rights related information within the DAM system. Wolfe emphasized the need for a unified rights language that is leveraged across an organization, along with consistent application of rights metadata within schemas that capture complex licensing parameters yet present them within a simplified, intuitive interface for users.

The Academy's chosen DAM system will be configured to translate business rules into workflows that facilitate effective DRM through the use of triggers that restrict access to assets based on user groups and permission levels. The DAM system will feature the ability to store and link rights related metadata (expiration dates, copyright status, rights holder contact information, etc.) and licensing documentation to individual assets as Wolfe (2013) advises, as well as the ability to watermark assets with Academy branding. To insure that rights metadata is linked with assets, core rights fields will be designated as mandatory during the asset ingestion process, preventing the addition of assets without this information into the DAM system. To assist with retaining rights metadata throughout an asset's lifecycle within multiple content management systems, the proposed metadata schema (Appendix A) also includes fields for entering links to works registered with the Picture Licensing Universal System (PLUS).

Digital preservation

To ensure long-term access and preservation of the Academy's digital assets, an active digital preservation strategy must be devised and put into practice. In order to maintain access to digital files, a number of components must be preserved: a digital object's bit stream, its container (file format), information about the digital object (metadata), the applications used to display and render the digital object, and the hardware used to store the digital object (Keller & Buckner, 2014). Because the chosen vendor of the DAM system will be managing the hardware, software, database, storage and security of the Academy's assets through a subscription model, it is critical to determine the strategies and policies that the vendor will employ to maintain data persistence over time, and put into place complementary strategies within the Academy to ensure that assets are protected and preserved for as long as deemed necessary.

Current storage infrastructure

The Academy currently utilizes dedicated network attached storage (NAS) to house the majority of their digital assets. These shared drives are allocated to various departments and enable multiple users to access digital assets, but they do not provide the security and scalability necessary for managing the volume of digital assets currently held by the Academy, nor the amount of assets that staff are likely to accumulate in the future. In fact, long form video is currently stored by an outside production agency due to lack of storage space within the Academy's IT infrastructure.

Proposed digital preservation strategies

Brookes and Windsor (2013) provide advice on mitigating the risks of data loss for organizations implementing DAM within a SaaS model. To ensure that the Academy's data is secure and that access to the DAM software is maintained should the vendor no longer support it, the Academy's digital preservation plan will include the specific strategies that Brookes and Windsor (2013) detail in their "DAM SaaS Survival Guide:"

- **Hosting suppliers:** the vendor's hosting supply chain (suppliers, data centers, connectivity) will be identified and audited periodically.

- **Backups:** vendor backup procedures will be identified and confirmed through written contracts. Compliance certificates and information on offsite backups and data retention periods will be documented. Random backup checks and asset audits will be performed, and the Academy will reserve the right to create its own data backups.
- **DAM software:** copies of the DAM software's object and source code and the virtual environment will be requested, along with information on additional required system components and licensing documentation.

These measures will ensure that the chosen vendor's digital preservation strategy provides adequate data redundancy and persistence. Depending upon the Academy's need for continual access to digital data, issues of data resiliency will also be discussed with potential vendors. In order to protect digital data during routine operations such as editing, replication, and migration, the chosen vendor's storage capacity should be discussed, as well as options for hierarchical storage management and virtualization.

In addition to insisting on vendor transparency regarding digital preservation practices, there are a number of measures that DAM administrators will need to perform on an ongoing basis. The Academy's digital preservation strategy will include the following activities, recommended by Tadic (2014):

- Creation of checksums for final assets, both on a scheduled basis and when files are distributed
- Scheduled format obsolescence checks
- Validation and migration to new media storage formats within 5-year cycles
- Tracking of all actions taken upon digital assets through the capture and maintenance of technical and preservation metadata

Jantz (2005) recommends the use of persistent identifiers as an additional strategy for ensuring access to digital data. The proposed metadata schema provides fields to capture this information. As is the case with all technology-based initiatives, Jantz reminds us that technology alone cannot solve the challenge of digital preservation, stating "Ultimately, users will need to be able to trust the people and organizations who have taken on the responsibility for managing the processes and technology of digital preservation" (2005, conclusion, para. 3).

Vendor selection

Considering the large number of DAM vendors available in today's DAM market, choosing a DAM solution is quite a challenge. As detailed in Table 2, the chosen DAM system must accommodate diverse use cases, multiple workflows, flexible metadata schemas, hierarchical controlled vocabularies, and controls for managing and distributing intellectual property. The following baseline requirements were used to create a vendor short list:

- With the phased rollout plan across the museum and ongoing digitization of the Academy's various collections, the DAM system will feature enterprise level architecture and functionality.

- Due to limited IT infrastructure in-house, the DAM vendor must provide a hosted SaaS delivery model.
- The DAM solution must be proprietary; open source solutions cannot be adequately maintained with the current level of in-house IT staffing.
- Because museums have complex information management and integration needs, the DAM vendor should have experience working with museum clients that have similar needs and volumes of digital assets.
- The DAM solution must provide sufficient support for flexible metadata schemas and hierarchical/faceted controlled vocabularies.
- The DAM solution must include an integrated web client interface.

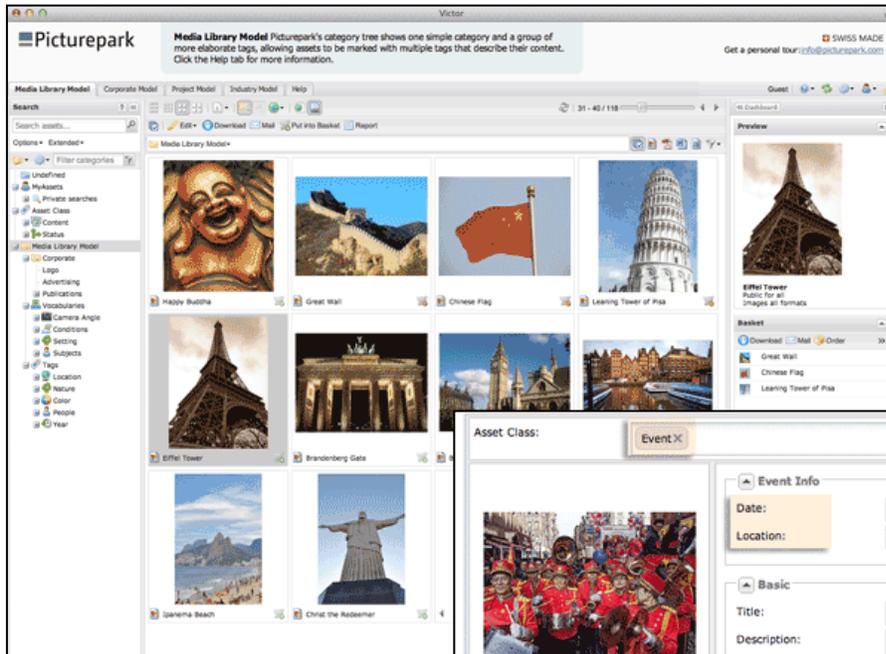
Vendor evaluation

A spreadsheet distributed by the Digital Asset Management (DAM) SIG of the Museum Computer Network (MCN) was used to assist in initial identification of vendor products used by museums (Digital Asset Management (DAM) SIG, 2012). Of these vendors, the following were found to meet the baseline requirements outlined above, along with sufficient information on their web sites for competitive evaluation:

- MediaBeacon (R3volution)
- NetXposure (NetX)
- Picturepark (Picturepark®)

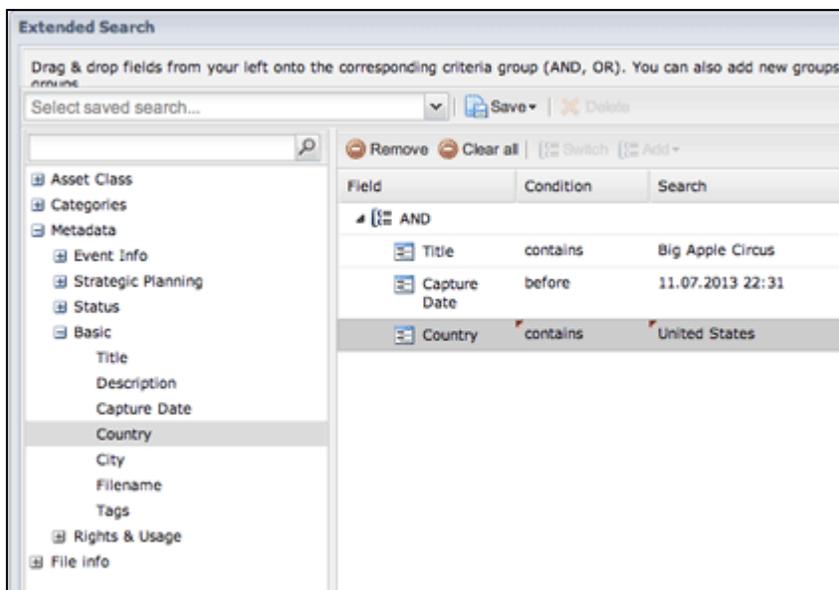
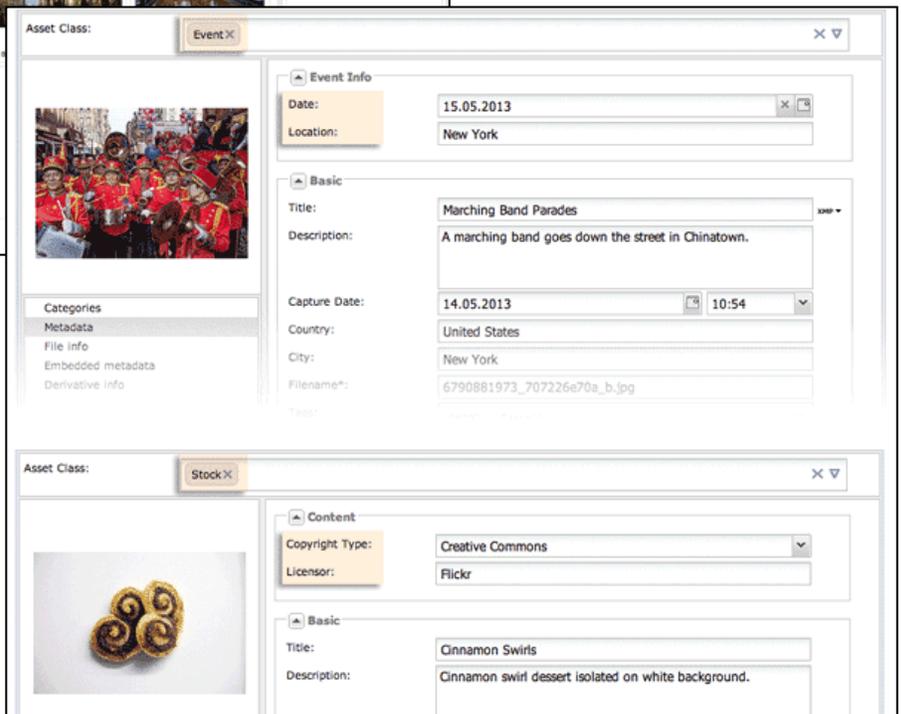
Although all three of these vendors and products meet the baseline requirements outlined above, Picturepark® is the suggested vendor of choice due to their DAM product's support for adaptive metadata and direct integration with both Dropbox and Sitecore. These features will provide DAM administrators and end users with an intuitive user experience, enabling them to take advantage of "out of the box" Sitecore integration without the need for custom API development.

Picturepark® is a proprietary enterprise level DAM solution produced by Vision Information Transaction, a Swiss vendor. In alignment with the baseline requirements listed above, Picturepark® can be deployed using a SaaS delivery model. A highly scalable service-oriented architecture provides enterprise level infrastructure that can be scaled to meet future asset volume demands. Picturepark® features strong support for flexible metadata schemas and controlled vocabularies, a web client interface for DAM administrators and users, as well as integrated, customizable web portals that can be branded for specific distribution channels. The screenshots below highlight a few of the features from this robust DAM solution.



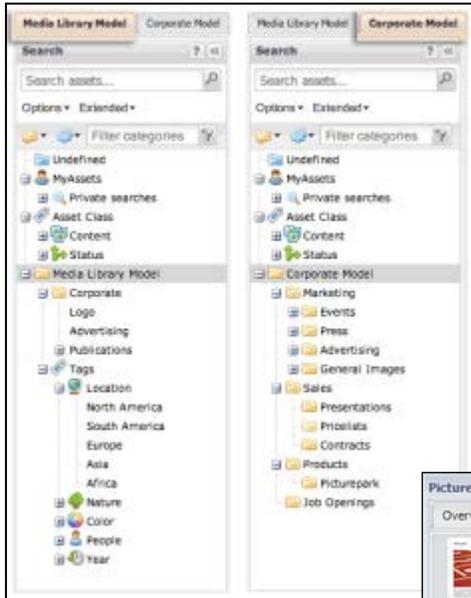
The Picturepark® user interface is clean and well organized.

Picturepark® features “adaptive metadata,” enabling the display of contextual metadata fields based on assigned asset tags.



The advanced search interface features sophisticated filters based on asset metadata parameters.

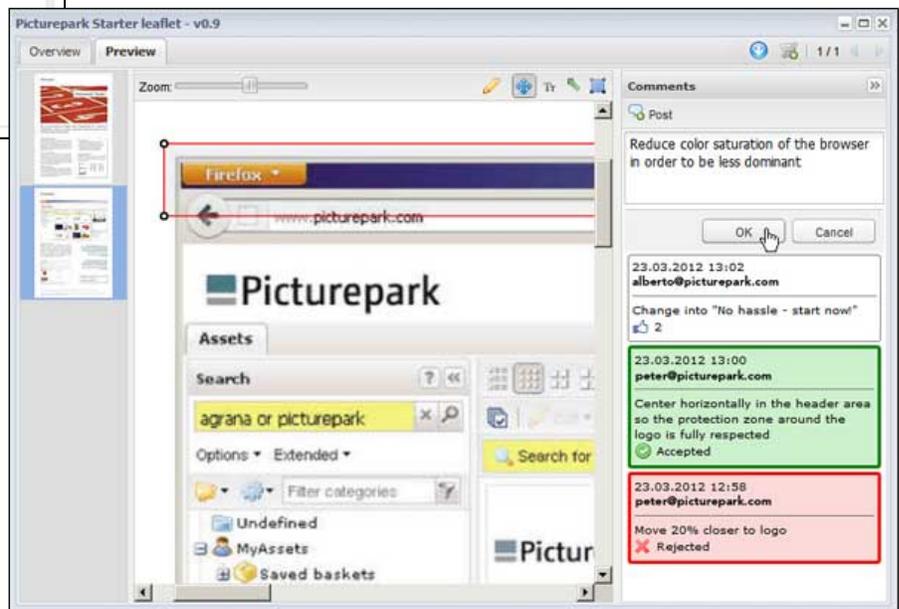
Picturepark® also supports the following search features: keyword search, folder browsing, filters, faceted search, full text search, and linked asset search.



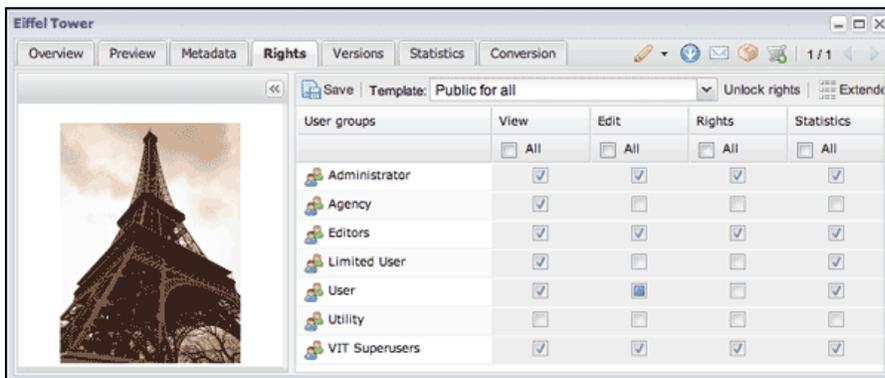
Multiple taxonomies are supported via separate “channel” tabs.

Controlled vocabularies are supported per-field, and the web services API can be used to enable integration with thesaurus management software.

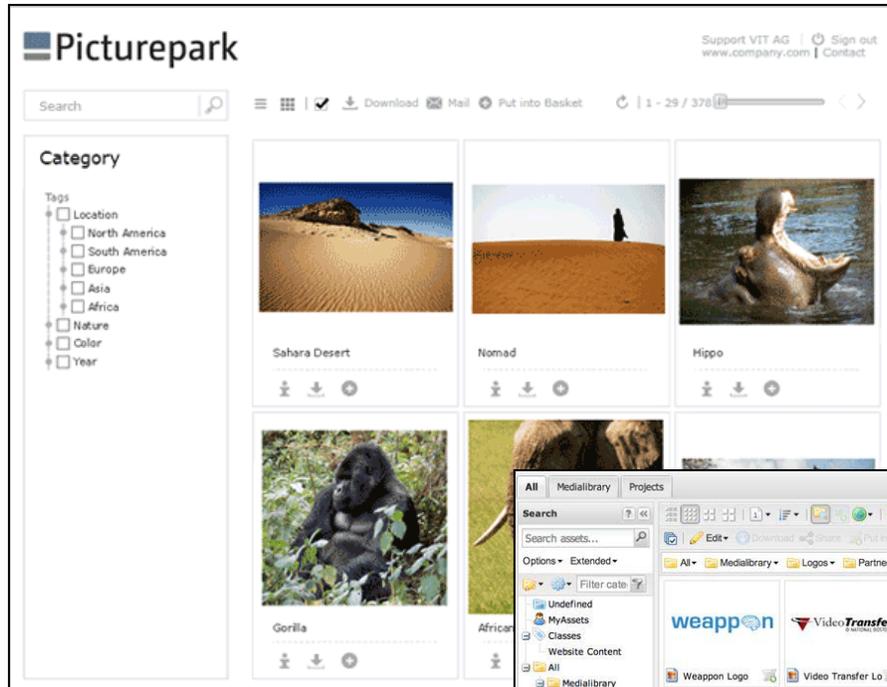
Picturepark® supports review and approval of in-process assets, enabling users to add comments, annotations, and ratings to assets throughout creative production workflows.



Access to assets and system functionality can be controlled through granular permissions models.



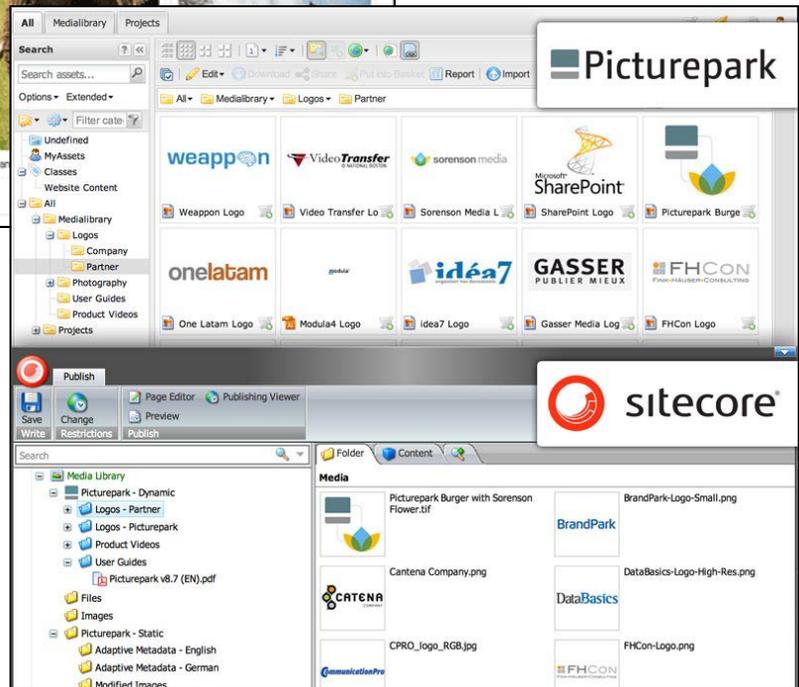
Access rights can be configured manually or in bulk using templates.



Download areas (ports) can be embedded into any website (including intranets), to provide users with access to pre-filtered assets.

Custom branded ports can also be configured to provide users with simplified interfaces that still allow for control over user rights and system functionality.

With direct Sitecore integration, live assets and metadata can be pulled from Picturepark® directly from the Sitecore editor.



These are just a few highlights of the multitude of features provided within the Picturepark® DAM system. This solution provides robust functionality that will serve the Academy well for years to come.

Vendor pricing

Estimated pricing available from the Picturepark website can provide a ballpark figure for a typical cloud deployment for a marketing team of less than 10 people. The one-time cost for cloud deployment is \$10,000. The 2-year total is \$40,000, and the 5-year total is \$85,000. These estimates include annual maintenance, software upgrades, and support.

Staffing

No DAM implementation plan would be complete without consideration of staffing needs. Although a DAM *system* implementation can be seen as a relatively short term project, digital asset management is a long term critical business function that requires dedicated staffing to ensure success.

Ideally, at least one full time information professional should be assigned ownership of implementing, managing, and maintaining the DAM system and related information management initiatives in accordance with the Academy's overarching digital strategy goals. This staff member should be the point person for all issues and services related to the DAM system and these initiatives by internal and external parties. In addition to implementing, configuring, customizing, upgrading, and troubleshooting the DAM system with respect to user needs, this staff member will also provide instruction to users on how to access and use the DAM system. Training should also be provided on policies, procedures, and issues related to copyright and licensing restrictions, information governance, metadata standards, and digital workflow.

Because DAM implementations can be complex, the services of a DAM consultant should be considered prior to beginning the DAM implementation. A DAM consultant can assist with any part of the implementation plan, and can bring his or her broad expertise and experience with prior successful implementations to bear on the Academy's specific needs.

Strategic alignment

To ensure the long-term access, management, and preservation of the Academy's digitized collections, it is critical to implement a DAM system. Providing for the proper storage, security, and management of the Academy's digital data is a prerequisite for enabling the discovery and use of the Academy's unique resources for research, teaching, and exhibition, as stated in the Academy's strategic plan. With a centralized, standardized platform for managing digital assets, the Academy will be well positioned to leverage its unique data to meet these strategic goals as well as create new revenue streams. This initiative would not only enable institutional sustainability—it would also enable the Academy to augment its heritage and secure its position as the leading natural history museum dedicated to biodiversity and environmental science for the future.

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APPENDIX A: Data Dictionary

Note: The Display field indicates which category/class a field is associated with. When assets are tagged with this class, the field will be displayed.

Descriptive metadata						
Field name	Description	Vocabulary	Obl.	Input	Repeat	Display
Title	The unique name given to the digital asset		Y	Manual	Y	All
Creator	The name of the person who created the digital asset		Y	Manual	Y	All
Creator role	The creator's role in producing the digital asset (designer, photographer)	Controlled pick-list	Y	Manual	Y	All
Status	The creator's employment status	staff, contract	Y	Manual	N	All
Keywords	Terms used to describe the subject of the digital asset's content	Custom thesaurus	Y	Manual	N	All
Description	An account of the digital asset		Y	Manual	N	All
Collections	Collection in which the digital object depicted is cataloged	Controlled pick-list	N	Manual	N	All
Publisher	The entity responsible for publishing the digital asset (ANSP)	Controlled pick-list	Y	Manual	N	All
Event	A museum event associated with or depicted within the digital asset	Controlled pick-list	N	Manual	N	All
Exhibit	A museum exhibit associated with or depicted within the digital asset	Controlled pick-list	N	Manual	N	All
Location	A museum location associated with or depicted within the digital asset	Controlled pick-list	N	Manual	Y	All
Program	A museum program associated with or depicted within the digital asset	Controlled pick-list	N	Manual	N	All
Campaign name	Campaign associated with the digital asset		N	Manual	N	Campaign
Campaign type	The type of campaign in which the digital asset was used (print, web, tv)	Controlled pick-list	N	Manual	N	Campaign
Target audience	The target audience for a campaign in which the digital asset was used	Controlled pick-list	N	Manual	Y	Campaign
Campaign manager	The manager of campaign in which the digital asset was used	Controlled pick-list	N	Manual	N	Campaign
Project name	Project associated with the digital asset		N	Manual	N	Project
Project type	The type of project in which the digital asset was used (postcard, ad, etc.)	Controlled pick-list	N	Manual	N	Project
Publications	Publications in which the digital asset was used		N	Manual	N	All

Technical/structural metadata						
Field name	Description	Vocabulary	Obl.	Input	Repeat	Display
Media type	The nature or genre of the digital asset	<u>DCMI Type</u>	Y	Auto	N	All
Creator application	The application used to create the digital asset		N	Auto	Y	All
Filename	Filename upon upload		N	Auto	N	All
Checksum	Sum generated by checksum algorithm for the digital asset		Y	Auto	N	Admin
Start time	The timestamp for the beginning point of playback for the digital asset	SMPTE	Y	Auto	N	Video
End time	The timestamp for the ending point of playback for the digital asset	SMPTE	Y	Auto	N	Video
Duration	The timestamp for the overall playback time of the digital asset	SMPTE	Y	Auto	N	Video
File size	File size of the digital asset		Y	Auto	N	All
File format	File format of the digital asset		Y	Auto	N	All
Encoding	Format used to encode/compress the digital data stream	<u>essenceTrackEncoding</u>	Y	Auto	N	Video
Bit rate	The amount of data in the digital asset that is encoded, delivered or distributed, for every second of time		Y	Auto	N	Video
Orientation	The orientation of the digital asset					All
Height	Vertical size of the digital asset		Y	Auto	N	Images/Graphics
Width	Horizontal size of the digital asset		Y	Auto	N	Images/Graphics
Frame height	Vertical size of the digital asset's video frame		Y	Auto	N	Video
Frame width	Horizontal size of the digital asset's video frame		Y	Auto	N	Video
Frame rate	Number of frames per second during playback of the digital asset		Y	Auto	N	Video
Aspect ratio	Ratio of horizontal to vertical proportions in the display of the digital asset		Y	Auto	N	Video
Video tracks	The number of video tracks within the digital asset		Y	Auto	N	Video
Color mode	The digital asset's representative color space	<u>instantiationColors</u>	Y	Auto	N	Images/Graphics /Video
Color profile	The digital asset's input/output device profile as determined by the originating software		N	Auto	N	Images/Graphics
Number of pages	The number of pages included within a digital document		N	Auto	N	Documents

Administrative metadata						
Field name	Description	Vocabulary	Obl.	Input	Repeat	Display
Accession ID	Unique internal accession number (assigned by DAM)		Y	Auto	N	Admin
Identifier	An unambiguous reference to the digital asset	URI	N	Manual	N	All
Contact	Contact information for digital asset owner/manager		Y	Manual	Y	All
Department	Custodial department of the digital asset	Controlled pick-list	Y	Manual	N	All
Date created	Date the digital asset was created	ISO 8601	Y	Auto	N	All
Date uploaded	Date the digital asset was uploaded	ISO 8601	Y	Auto	N	Admin
Uploaded by	User ID/name of person who uploaded the digital asset		Y	Auto	N	Admin
Routed to	Person who is responsible for reviewing the digital asset		N	Manual	Y	Workflow
Routing notes	Notes regarding the routing process for the digital asset		N	Manual	Y	Workflow
Approval status	The digital asset's current approval status within a workflow	Controlled pick-list	N	Manual	N	Workflow
Approved by	The person who approved the digital asset within a workflow	Controlled pick-list	N	Manual	N	Workflow
Date cataloged	The date the digital asset was cataloged		Y	Auto	N	Admin
Cataloger	The person who cataloged the digital asset	Controlled pick-list	Y	Auto	N	Admin
Linked assets	Related digital assets linked to the asset		N	Auto	N	Documents

Rights metadata						
Field name	Description	Vocabulary	Obl.	Input	Repeat	Display
Copyright status	Category/code indicating the digital asset's rights status	Controlled pick-list	Y	Manual	N	All
Expiration date	The date the digital asset's permission expires or rights must be renewed	Calendar drop-down	N	Manual	N	All
Release date	The date the digital asset may be distributed	Calendar drop-down	N	Manual	N	All
Credit line	Attribution required to appear in conjunction with the digital asset		N	Manual	Y	All
Licensor name	Name of each licensor		N	Manual	Y	License
Licensor ID	Registered licensor ID associated with an online licensing system	PLUS-ID	N	Manual	Y	License
Licensee name	Name of each licensor		N	Manual	Y	License
Licensee ID	Registered licensor ID associated with an online licensing system	PLUS-ID	N	Manual	Y	License
Terms and conditions	Link to complete terms and conditions applying to the license		N	Manual	N	License
License start date	The date on which the license takes effect	Calendar drop-down	N	Manual	N	License
License end date	The date on which the license expires	Calendar drop-down	N	Manual	N	License
Distribution rights	Geographic regions in which copies of the asset may be distributed by a	Controlled pick-list	N	Manual	N	License

	license holder					
Model release status	Status and link to complete model release statement	Controlled pick-list	N	Manual	N	License
Model release ID	Registered model release ID associated with an online licensing system	PLUS-ID	N	Manual	N	License
Property release status	Status and link to complete property release statement	Controlled pick-list	N	Manual	N	License
Property release ID	Registered property release ID associated with an online licensing system	PLUS-ID	N	Manual	N	License