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Born of Collaboration: The Evolution of Metadata Standards in an Aggregated Environment

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Abstract

As more libraries adopt digital preservation platforms or contribute material to multi-institutional digital content aggregators, they often find that the metadata originally created for distinct digital collections does not work well in the new environment. The University of Illinois at Chicago (UIC) Library has encountered this problem as well. This case study discusses the successful collaboration between different departments within our university library to improve our metadata for increased usability. We created a cross-departmental Metadata Working Group to develop a new Metadata Guideline, in conjunction with a project to analyze and clean up our legacy metadata. These two projects facilitated needed standardization of our digital collections metadata, and improved coordination of our standards with those of aggregate systems moving forward.

The ability for users to easily find what they are looking for was a key consideration in our metadata improvement efforts. In addition to observing how our metadata appears in aggregated contexts, it was challenging to make our digital materials available to our users due to incomplete metadata. Cross-collection searching is not possible with our current CONTENTdm system, but is an important consideration as we prepare for migration to a Digital Asset Management System (DAMS).

In order to coordinate cleanup of our legacy metadata and provide a clear set of guidelines for new collections, a new set of guidelines, based on existing ones, was developed. Creation of the new guidelines was accomplished in tandem with the review, analysis, and cleanup of our existing collections, an iterative process in which each of these activities contributed to the other. We developed solutions for issues we encountered in the metadata, including inconsistent field labeling and mapping, inconsistent use of standardized vocabularies, and misinterpretation of field usage.

Our new usability-focused metadata workflow, incorporating collaborative participation and workload sharing along with new techniques and documentation, helped improve our overall approach. This collaboration combines library faculty and staff knowledge of metadata standards from our Resource Acquisition and Management Department (RAM), an understanding of the user assessment/experience perspective from our Digital Programs & Services Department (DP&S), and a more content-oriented perspective from our Special Collections Department. The resulting positive impacts include improved communication and workflows, higher quality metadata, and renewed momentum to move forward with digital projects.

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Introduction

As more libraries adopt digital preservation platforms or contribute material to multi-institutional digital content aggregators, they often find that metadata originally created for distinct digital collections does not work well in the new environment. Even when there are standards in place, making sure that they are followed can be difficult.

Maintaining adherence to metadata standards has been a problem that has affected digital collections at the University of Illinois at Chicago (UIC) in the past. A 2011 article by a former metadata librarian at our institution discussed the creation of a data dictionary for all metadata records uploaded into the CONTENTdm system, describing a workflow that involved participation by stakeholders to implement these standards.[1] An ad hoc working group created new guidelines, starting from existing local guidelines, that mapped to Dublin Core and meshed with the Consortium of Academic and Research Libraries in Illinois (CARLI) guidelines for CONTENTdm, producing a data dictionary for descriptive metadata. That metadata model allowed project managers to add local custom fields for collections. Unfortunately, this resulted in a proliferation of fields which contained similar data, but which may not have been mapped in the same way.

Need for Metadata Reassessment

When our library's previous metadata guidelines, the Data Dictionary, was developed about 2009, a rosy, orderly future for metadata creation was envisioned. And yet, several years later, we found ourselves in almost the same position as we were then. So, what happened? Where did we go wrong? As is often the case in complex situations, there was no single cause. A combination of many factors contributed to the disorder of our metadata.

One of the factors was related to communication issues. There were many potential places where documentation could be located, including file servers, wikis, Box, and Google Drives. Collection documentation created by one librarian may not have been accessible to another. In such a decentralized environment, it is easy to see how idiosyncratic practices could arise and continue.

Another factor was that metadata from legacy collections were not brought into compliance with the Data Dictionary when it was created. Conflicting examples of metadata field usage continued to exist as new collections were made. For example, several of our legacy collections contained a field called "Physical Description". In one of these, the Metropolitan Planning Council 1934-2000 collection, this field held only one value, "film negatives". In a second, the Puerto Rican Cultural Center collection, the field contained twenty-one different values, some describing broad categories of physical objects ("Book" and "document"), some providing additional detail about a physical object ("Tri-fold brochure"), and still others providing detail about the medium used to create the physical object ("C-print" and "Colored pencil"). Likewise, in a third collection containing images from the campus art gallery, the "Physical Description" field contained a mishmash of curator-assigned terms and included information on material types, the running times of videos, and measurements of two-dimensional artworks.

A lack of continuity resulting from staff changes was yet another factor. Over the past ten years, there have been three people in the position of Metadata Librarian. There have also been periods of time where there was no designated person or group to answer questions or to consult

with about the design of a metadata template for a new collection. As a result, the way that metadata standards were interpreted and applied varied from collection to collection. While one project manager interpreted the "Is Part Of" field as the appropriate way to communicate that an item being described came from a newspaper, another used the "Form" field in combination with a "Publisher" field to communicate the same information.

The departments that worked with digital collections materials have also experienced significant changes over the last ten years, including turnover – only one staff member remains from the group which created the Data Dictionary. In addition, the Digital Programs & Services Department, once a small unit of under four people, has since expanded to twelve full-time staff members. Today, the group of librarians responsible for creating new digital collections has little familiarity with the earlier guidelines. This is compounded by the fact that, in the past, metadata decisions for digital collections were not consistently documented, so it is now often impossible for current staff to understand why certain decisions were made. In addition, the working group that oversaw the creation of the Data Dictionary was dissolved after the departure of the metadata librarian who spearheaded its creation. Though it was meant to be a living document, without an actively maintained governance structure in place, there was subsequently no clear way to easily bring up new issues for discussion or to ask questions to clarify certain parts of the guidelines.

Segregated collections also contributed to the disarray of our metadata. During the time when our previous metadata guidelines were in development and use, our digital collections system architecture (CONTENTdm) did not permit faceting across collections and required end users to search each collection separately. When considering the end user experience, it was less important for library staff to ensure that collection fields and vocabulary terms were standardized across collections, which contributed to a mismatch in both terms used and the ways fields were used. While metadata exports could be done, it was difficult for staff to compare metadata across collections when the data wasn't searchable together. As a result, any future system that did allow cross searching would reveal many inconsistencies inhibiting efficient searching and negatively impacting the end user experience. One of these inconsistencies involves what controlled vocabularies were used for subject fields. While the Data Dictionary recommended specific controlled vocabularies for subject fields, these were not always followed, and in some cases, local terms were used instead. As a result, a user would need to search on several different facets to find all content related to the West Town neighborhood in Chicago, for example. This would include slightly varying terms such as West Town (Chicago, Ill.) and West Town, but also terms with a very different structure representing the same information – such as the number 24, which is the official City of Chicago Community Area number for West Town.

Lastly, time constraints were another key factor contributing to metadata inconsistencies. For a variety of reasons, digital collections often needed to be created and made accessible online within a limited time frame. Without an available template for creating a new collection or a quick way to have questions answered, the existing metadata guidelines were not followed as closely as they could have been.

The need for cleanup of legacy metadata, and creation and enforcement of more rigorous standards for the creation of new metadata is widely discussed in the literature. One compelling reason for metadata cleanup and standardization is the migration of digital collections from one system to another, including harvesting into aggregated systems. At the University of Utah, a recent system migration highlighted the necessity for such a change.[2] Likewise, our library will

be migrating our digital content into a Digital Asset Management system (DAMS) in the coming months, and these metadata projects contribute to preparations for this change.

The ability for users to easily find what they are looking for was another key consideration in launching our metadata improvement efforts. It was highly instructive for us to observe how our metadata appears in aggregated contexts such as the Digital Public Library of America (DPLA)[3] and EXPLORE Chicago Collections[4]. Doing so allowed us to see what information was missing or unclear, and to also see potential usability issues that were not immediately apparent within our local discovery system. For example, some of our legacy collections used to have a field called "Sponsorship", which mapped to the Dublin core term "Description". The information in this field was combined with the regular "Description" field in aggregated contexts because both fields mapped to the same Dublin Core term. It could be very confusing to users without looking at the same record in our local system. From examination of our legacy metadata and from limitations encountered in our previous workflow model, we realized that it was necessary to make significant changes to avoid facing the same issues in the future.

Organizing Structure and Revising Standards for Cleanup

Our first step was to re-organize and reactivate our metadata effort. In September 2016, a new metadata working group was formed, with a first task of reviewing our existing Data Dictionary for descriptive metadata that had been created by an ad hoc working group, mapped to Dublin Core and coordinated with the CARLI guidelines for CONTENTdm. Our working group created an initial draft of new metadata guidelines based on that document, with revisions and enhancements devised to resolve issues encountered in existing metadata. The new guidelines were placed on Google Docs and shared among members of the working group. Drawing on issues faced and solutions implemented during the processes of metadata cleanup of legacy collections and implementation of consistent standards in new digital collections, our metadata guidelines became more thorough and complete. Appendices with detailed guidelines for compound objects, born digital content, and oral histories are now included. To resolve standardization issues, the metadata working group made a significant effort to lay out which standards metadata creators should follow for a specific field. These standards included the Library of Congress Name Authority File, Faceted Application of Subject Terminology (FAST) headings, the Art & Architecture Thesaurus (AAT), International Standard ISO 8601 for numeric representations of date and time[5], and International Standard ISO 639-5 code to represent the names of languages.

During the development of the new guidelines, a large number of fields were discussed. Among these, the working group felt that geographic terms are extremely useful for many of our collections, since they are very likely to be searched on by an end user. Keeping in mind our goal of improving the usability of our digital collections, we decided to add a new field "Address" to contain the many specific street addresses that are contained in our metadata, as well as some less specific geographic location metadata (eg. intersection at Avenue "L" and 105th Street). This solution avoided the alternative of adding multiple values to our existing Geographic Location field, and thereby making that field non-functional as a faceted field. As well, the mapping for the "Address" field identifies it as geographic data in an aggregate context.

In our previous guidelines, specific namespaces were not defined for fields, resulting in different vocabularies being used, and preventing effective searching of collections.[6] During

metadata cleanup, identifying the various controlled vocabularies that were used required careful examination of each collection's metadata set. Many academic institutions report similar issues affecting their metadata - inconsistent data and data formats, lack of standardization, lack of controlled vocabularies, and unused fields are frequently cited.[7]

A metadata cleanup project at The University of North Carolina (UNC) at Chapel Hill made several decisions that parallel ours, including deleting metadata fields that have no use, changing field names to more accurately reflect content, merging content into more appropriate fields, and hiding fields which contain useful information for staff, but which are not helpful or would cause confusion for users.[8] Like us, the UNC study notes the presence of legacy metadata fields which do not fit into their data dictionary, but which are maintained as exceptions because of their value to specific unique collections.

Another area which many identified as needing additional attention is the clarification and mapping of rights statements.[9] As we have done for our collections, the Minnesota Digital Library and New York Public Library have both adopted the rightsstatement.org statements[10] for inclusion in DPLA. The New York Public Library also made a concerted effort to increase the number of records with rights statements, increasing the proportion from about 16% to about 80%.[11]

One of the biggest improvements we brought to our new guidelines was clarifying the nature and use of the three interrelated fields "Type, "Form" and "Medium" which frequently had been used interchangeably, as well as the related fields "Extent" and "Subject-Genre". Problems with "type" and "format" fields are not unique, as discussed by the Pennsylvania State University's Visual Image User Study (VIUS).[12] For our new guidelines, efforts were made to precisely define how to use each element and to define how they are different. In addition, we made the decision to specify that distinct schema were to be used for each of these elements to further differentiate them in metadata creators' minds. For example, we specified that the "Type" element should be the most general description of the digital object and only draw from the Dublin Core Metadata Initiative (DCMI) Type controlled vocabulary. Values for "Type" should be "Image" for images containing text, except in cases of documents scanned using Optical Character Recognition (OCR). The "Form" element should define the purpose of the original object - what was it used for - and should only contain terms from the FAST controlled vocabulary. A list of the Form terms which apply to our digital collections was included in our new metadata guidelines document. The Art and Architecture Thesaurus (AAT) was defined as the vocabulary scheme from which "Medium" terms should be selected, and the Thesaurus of Graphic Materials (TGM) for "Subject-Genre" terms. Our cleanup resulted in consistency across collections for these fields.

Fig. 1. Front of invitation card for *Jornada 100 x 35*, a year-long celebration of the centennial of the birth of Puerto Rican nationalist poet Juan Antonio Corretjer, and of the thirty-fifth anniversary of Chicago's Puerto Rican Cultural Center, 2008. Puerto Rican Cultural Center Collection, University of Illinois at Chicago Library, Special Collections.

Cleanup of a metadata record in the Puerto Rican Cultural Center Collection			
Before Cleanup		**After Cleanup**	
Type	Text	**Type**	Image
Form Genre	Cards	**Form**	Invitation cards
Physical extent	2-sides	**Medium**	Color printing
		Notes	This is page 1 of 2 total

Table 1. Changes in selected field names and values after metadata cleanup of the record for the invitation card for *Jornada 100 x 35* (Fig. 1, above), Puerto Rican Cultural Center Collection, University of Illinois at Chicago Library, Special Collections.

Collaboration and Workflow

In our library's previous workflow model, a designated collection stakeholder/project manager (usually from Special Collections) consulted with the metadata librarian when a new digital collection was being created. After that meeting, the practice was "If the need arises, project managers bring their requests to the metadata librarian who determines the appropriate

mapping."[13] Once the fields and their mapping for a collection were set, the important work of metadata creation and enhancement was frequently delegated to student workers. However, because of the complexity and length of the Data Dictionary, students creating metadata did not consult it for guidance when entering information in a specific field. The solution was to have them look up examples in existing online image collections as a guide. The fact that legacy metadata (created before the Data Dictionary) was still present in online collections was recognized, as well as the fact that this would lead to perpetuating mistakes. The need for shorter documents focused on data input for a specific collection and containing relevant examples was also recognized.[14]

Now at UIC, when a new digital collection project is in its beginning stages, the metadata consultation is held with the metadata working group - a critical initial step which brings all project stakeholders onto the same page from the outset. Like the previously existing team, our new metadata working group involves librarians from multiple departments, including one librarian from Technical Services known as Resource Acquisition and Management (RAM) who is the group lead, two librarians from Special Collections, and two librarians from Digital Programs & Services. In our new workflow, working group members participate in regularly scheduled meetings to exchange questions, ideas and comments regarding the guidelines and its implementation. All proposed additions and revisions are discussed and approved by the group before being incorporated into that document. Instead of the previous practice of relying on contact between a single person (metadata librarian) and an individual project manager, all members of the working group now take ownership of and contribute to metadata guidelines development and maintenance as well as building metadata profiles for new collections. Working together as a group facilitates better understanding of each other's different perspectives, helps improve interdepartmental communication, and keeps everyone in the group on the same page. Implementing a shared ownership model also helps avoid the loss of institutional memory when personnel changes occur, since all information is accessible and shared jointly by the group and is not lost when one person departs.

Communication and collaboration across different communities of practice occurs at the New York Public Library to prepare local metadata for ingest into DPLA. Metadata unit staff members, who also serve as liaisons to different research units, perform audits on resource descriptions to ensure that at least six core elements are present, and that these are well-formed and useful as access points. In addition, they make sure dates are properly formatted, and that subjects have Uniform Resource Identifiers (URIs). These metadata liaisons meet with their assigned research departments to discuss inconsistences and proposed remediations.[15] A workflow is followed where metadata aggregation and enrichment is layered on top of the source metadata, so there is no interference in specialized metadata work - and no one is forced to change their practices or standards. Staff appreciate the value of collaboration when milestone accomplishments such as a major release of images to DPLA and the general public are realized.[16]

We collaborate in a similar way in our practice. For example, a separate project group was formed to consult and collaborate on the Richard J. Daley Era Photographs Collection[17] project on a regular and ongoing basis. This large collection served as a pilot project implementing our new metadata guidelines and metadata creation workflow. Project group members, representing multiple departments, included a project manager who oversaw the progress on all aspects of this project including digitization and metadata creation, a metadata librarian who provided expertise on metadata standards and controlled vocabularies, including

guidance for the catalogers creating metadata, and an archivist familiar with the content of this collection who provided important information about content and context to help improve metadata accuracy. The metadata working group, in consultation with Special Collections stakeholders, was responsible for selecting the necessary Dublin Core fields for this particular collection and developing a controlled list of frequently used subject terms. Like our metadata working group, this project group is a collaborative team effort. Metadata creation for this collection is almost complete and our collaboration has been a success.
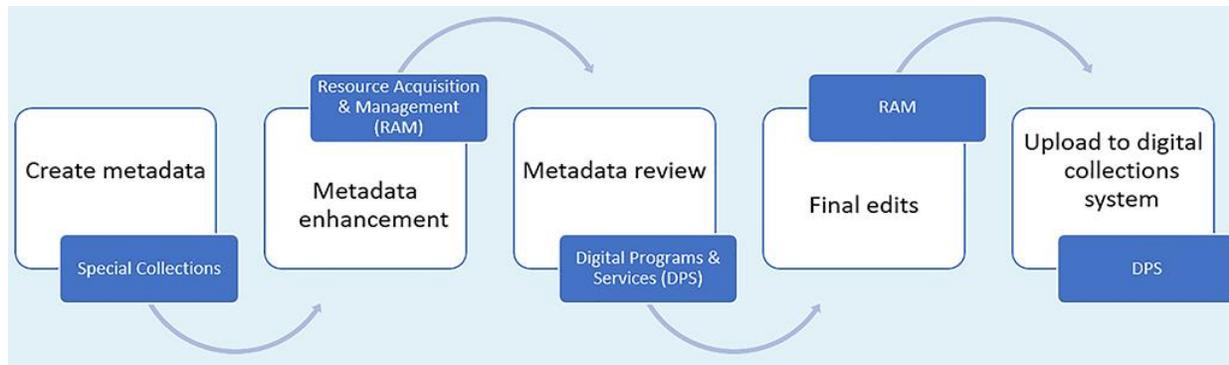

Fig. 2. Metadata workflow diagram showing metadata roles and functions of three different library departments at the University of Illinois at Chicago Library.

Creation of our new metadata guidelines was accomplished in tandem with the review, analysis, and cleanup of our existing collections, an iterative process in which each of these activities contributed to the other. When we initially discussed a plan for approaching metadata cleanup for our legacy collections, we felt one general cleanup document would not be the best approach to address the variety of issues encountered across all our digital image collections. Instead, before beginning any cleanup work, metadata working group members shared the task of creating individual metadata cleanup documents with detailed task lists for each of our thirty-three collections in CONTENTdm.

The cleanup documents for each of our digital collections live in an accessible online location shared by multiple members of the departments involved, not just metadata working group members. They serve several related purposes: check boxes for each task described allow the staff person doing cleanup to keep track of their work as they are doing it. As well, these documents remain as record of the metadata cleanup work done for others to consult in the future. Issues documented for cleanup included inconsistent field labeling and mapping, inconsistent use of standardized vocabularies, and misinterpretation of field usage. Several institutions have identified staffing issues as a contributing factor to challenges surrounding metadata creation, cleanup, and guideline enforcement. The Arizona Memory Project, which coordinates the work of a number of partner institutions, found that limited partner staff resources and partners with limited professional metadata knowledge were issues affecting metadata cleanup. They also identified "gray areas" surrounding metadata cleanup including "Who does the fixing?" and "How much fixing is 'good enough'?"[18]

The previously mentioned metadata project at UNC-Chapel Hill described a lack of consistency in workflow due to the number of different staff working on the project, their

varying levels of experience and expertise, and the extended time span over which metadata projects were carried out. Their staffing situation for metadata was characterized as "uncertain", requiring "fairly frequent training of new, and always temporary, project staff."[19]

Other recent articles describe an expanded staff model with multiple departments and groups responsible for the various aspects of digital collection production. The University of Virginia defined four separate groups, each responsible for a different area of the process of creating and publishing digital collections: Special Collections curators (image selection), Digital Production Group (digitization), Metadata Analysis and Design (metadata content standard selection and workflow management), and Digital Content Management (collection publication locally and to aggregators).[20]

Up until recently, metadata enhancement and cleanup at UIC was done by library staff whose primary roles did not involve work with digital image collections. These staff typically were not required to consult source documents, such as the metadata guidelines, to make metadata decisions. For these reasons, metadata enhancement and cleanup documents for each individual collection were of paramount importance to provide consistent and clear direction for metadata enhancement tasks.

In order to help the rest of the library understand our new metadata guidelines and new workflow, we feel proactive metadata training sessions are needed. In mid-2017, our working group hosted an initial metadata training session involving library colleagues from multiple departments including RAM, Digital Programs and Services, and Special Collections. In this session, the major changes and enhancements in our new metadata guidelines were introduced and the new metadata creation workflow was discussed. Hands-on exercises to provide practice in using the new guidelines were also incorporated. The feedback about this training was quite positive.

To enhance the collaborative process, we are establishing a more formalized metadata workflow to specify the major responsibilities of each department, which we think of as a "production line". In this workflow, archivists from Special Collections provide basic metadata, catalogers from technical services contribute all-important metadata enhancement and validation, and a project manager from digital services works with the metadata librarian to conduct the final metadata review before upload into the content management system (see Fig. 2). Recognizing the increased importance of digital collections to the overall suite of library resources, and the need to produce an increased amount of quality metadata, plans are in place to increase staff capacity for metadata creation in the metadata unit in RAM.

Sharing our Guidelines with the Metadata Community

The Digital Library Federation Assessment Interest Group's (DLF AIG) Metadata Interest Group maintains a clearinghouse of metadata application profiles from a variety of institutions. Our new metadata guidelines have recently been shared with the larger metadata community through the DLF AIG Metadata Application Profile Clearinghouse Project and are freely downloadable from that site.[21] Other institutions' guidelines are available outside this clearinghouse, including those of the Minnesota Digital library, currently in version 5.0,[22] and The University of North Texas Libraries.[23] As well, a number of Metadata Best Practices documents now exist online, including that for the Illinois Digital Heritage Hub, available through both the CARLI and DLF AIG sites[24].

Impacts and Outcome

Our new usability-focused metadata workflow, incorporating collaborative participation and workload sharing along with new techniques and enhanced documentation, has helped improve our overall approach, resulting in quality metadata and renewed momentum to move forward with digital projects. Our working group meetings continue to serve as an important forum for discussing issues and challenges encountered while creating the metadata cleanup documents. Discussions of various collection-based issues led to new ideas of how to refine and enhance our metadata guidelines for the benefit of all collections. As well, working as a group effectively helps us to have a holistic view of all our digital materials in various collections. When a decision is made for a specific field, it is clearly documented in our metadata guidelines and, importantly as well, is retroactively applied to all digital collections to ensure the consistency of metadata.

Conclusion

We still see opportunities to improve the new guidelines. We often feel limited by the "flat" structure based on the Dublin Core metadata schema, and would like to map elements to other schemas such as the Metadata Object Description Schema (MODS) to allow for increased flexibility. In the coming months, as we begin the work of migrating our digital collections into a Digital Asset Management System (DAMS), we anticipate the gaining additional new perspectives on metadata development and management as we use and become familiar with the new system. We look forward to integrating and implementing these into our metadata guidelines and workflow, keeping both actively evolving as systems change and grow.

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