VRA Bulletin

Volume 41 | Issue 2 Article 7

May 2015

FRBR and TMS: Applying a Conceptual Organizational Model for Cataloguing Photographic Archives

Sarah L. Gillis
Worcester Art Museum, sarah.l.gillis@gmail.com

FRBR and TMS: Applying a Conceptual Organizational Model for Cataloguing Photographic Archives

Abstract
Abstract

This is an updated version of a paper, "FRBR and TMS: Applying a Conceptual Organizational Model for Cataloguing Photographic Archives," presented at Collective Imagination 2014 in Vienna, Austria.

In order to manage the visual archive, containing analog photographic material as well as born-digital images, the Worcester Art Museum has been cataloguing images of objects from the permanent collection into the Media Module of TMS following the guidance of several conceptual models of organization. By referencing the digital preservation guidelines of the Digital Curation Center Lifecycle Model (DCC) and conceptual organizational models of the OAIS Reference Model and the Functional Requirements of Bibliographic Reference (FRBR) method of organization, an organizational model was implemented to better assist with the cataloguing to represent digital assets with their analogue parents. This paper looks at the archival cataloguing workflow and areas of CIDOC Conceptual Reference model's application in a collection management system, including advantages in clarity of metadata for analog and born-digital images.

Keywords
FRBR, TMS, Conceptual Reference Model, Digital Preservation, Digital Curation, Data Management, Images, Photographs, Analog, Digital, Born-digital, Information Organization, Digital Sustainability

Author Bio & Acknowledgements
Sarah L. Gillis, M.S. is the Assistant Registrar for Image Management at the Worcester Art Museum (Worcester, MA). She earned a BA in Art concentrating in Art History from the University of Southern Maine, then went on to obtain a Master's of Science in Information Science from Simmons College.

Introduction

As Galleries, Libraries, Archives and Museums (GLAMs), continue to integrate their physical collections within a digital world, new methods of organization need to be considered in order to ensure adequate discovery by end users and re-access by stakeholders in the years to follow. The Worcester Art Museum, or WAM, has been actively creating born-digital images since around 2002, and only recently launched an online collection search tool, eMuseum (product of Gallery Systems). Providing online access to our collection has re-awakened the institution to the archives that retain our institution's memory. Part of the sharing experience with the end user involves the digitization of the analog photographic archive (as necessary). Digitizing the analog photographic representations of the art objects is often easier than accessing and re-photographing an object to a born-digital file format (especially during time constraints). It is my responsibility as the Assistant Registrar for Image Management to oversee all object-related photography and ensure its accessibility and sustainability, both physically and digitally, for years to come.

Background

Founded in 1896 with acquisitions beginning in same year, the Worcester Art Museum has maintained a photographic archive that chronicles the evolution of documentation practices at the museum. The photographic archive for the permanent collection is composed largely of 8 x 10" glass plate negatives, prints, celluloid negatives, Kodachrome color negatives, color transparencies, lantern slides, and 35mm slides. This documentation has been accumulated from the beginning of collecting (1896) through roughly 2002. What survives begins around the 1920s-1930s--anything created prior has either not yet been discovered or has been lost to the sands of time. WAM's permanent collection is not static, and continues to grow with the inclusion of the John Woodman Higgins Collection (formerly the holdings of the Higgins Armory Museum in Worcester, MA), pushing our collection total to just over 38,000 objects as of July 2014. Just as the permanent collection grows, the rate of the images being produced on a yearly basis continues to increase. I am tasked with the maintenance of well over 200,000 analog representations of the majority of these objects (including the Higgins Armory photographic archive), and as of March 2015, about 70,000 born-digital images.

Throughout the Museum's history, the valuation of these analog photographic components has evolved. The unique traits associated with archival photographs include unique views of art objects in the museum's permanent collection before conservation treatment was performed, as well as installation photography. More often than not, the only evidence of an object's documentation within the collection is preserved within the analog photographic archive. These are unique instances of the object's life while at the Museum, and it is our responsibility to preserve and best capture the object's life through its photo-documentation. Part of this preservation requires in-depth cataloging of the photographic material. WAM's intellectual value of the photographic collection justified the means to preserve and digitize as much of the analog collection as possible. But how does one catalog an image of an art object, when it is not the object itself? Collaboration between art historians and information professionals at the Worcester Art Museum has promoted cataloging and preservation practices, and this will be the focus of the rest of my paper.

Coming from an Information Science background, with a concentration in digital archives and preservation methods, I had to think carefully and critically about the Museum's photographic assets. My main responsibility includes how the cataloging of photographs can be functionally integrated within our collection management system, The Museum System (TMS), and shared to the public through the online search tool powered by eMuseum. Another aspect which I had to consider was how the digital surrogates are preserved within our developing digital image archive, without the use of a digital asset management system. Part of my graduate studies focused on digital stewardship and how certain archival models should be considered for the management and preservation of physical and digital faces of a collection.

Conceptual Models

Before I can go in-depth about how photographic materials are cataloged and organized, it is important to understand how the assets fit within the Museum's holdings organization at a conceptual level. [1] The first conceptual model (Figure 1) that is immediately applicable to the care and maintenance of a given Museum's holdings is the Digital Curation Centre's (DCC) Curation Lifecycle Model. The DCC Curation Lifecycle Model "outlines the actions that comprise digital curation."[2] These "actions" involve the intake, appraisal, housing, and reappraisal processes that occur on a daily basis in museums--essentially the guidelines of "when" and "what" we do with objects (both physical and digital). Keep in mind that this conceptual model does not tell us "how" to take care of these objects, merely what we should be doing during their lifecycle in a given institution.

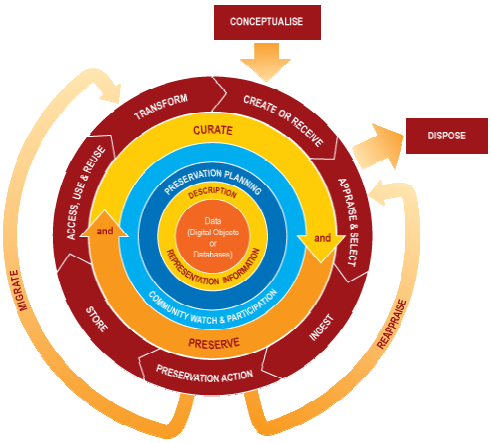

Figure 1 Digital Curation Centre, "The DCC Curation Lifecycle Model," Omeka at SIS, accessed April 13, 2015, http://50.17.193.184/omeka/items/show/458

Referenced alongside the DCC Curation Lifecycle Model is the Open Archival Information System, better known as the OAIS reference model (Figure 2), which is the conceptual organization of archival and preservation processes applied to objects. The OAIS reference model is a broader application/guideline of managing and disseminating information from one's holdings, whereas the DCC Curation Lifecycle Model emphasizes the various steps

[1] I say holdings and not permanent collection due to the amount of loans that fall under our purview; not applying these areas of appraisal and attention does not do a loaned object justice while in a given institution's care.
[2] Ross Harvey, *Digital Curation* (New York: Neal-Schuman Publishers, 2010), 33.

involved in this management and preservation process.[3] The DCC Curation Lifecycle Model is applicable across all GLAMs, which is why it fits neatly within my proposal to manage and properly catalog the photographic archive.[4] Separate from the steps involved within the DCC Curation Lifecycle Model, other actions were proposed based purely on the OAIS Reference Model for archiving procedures.

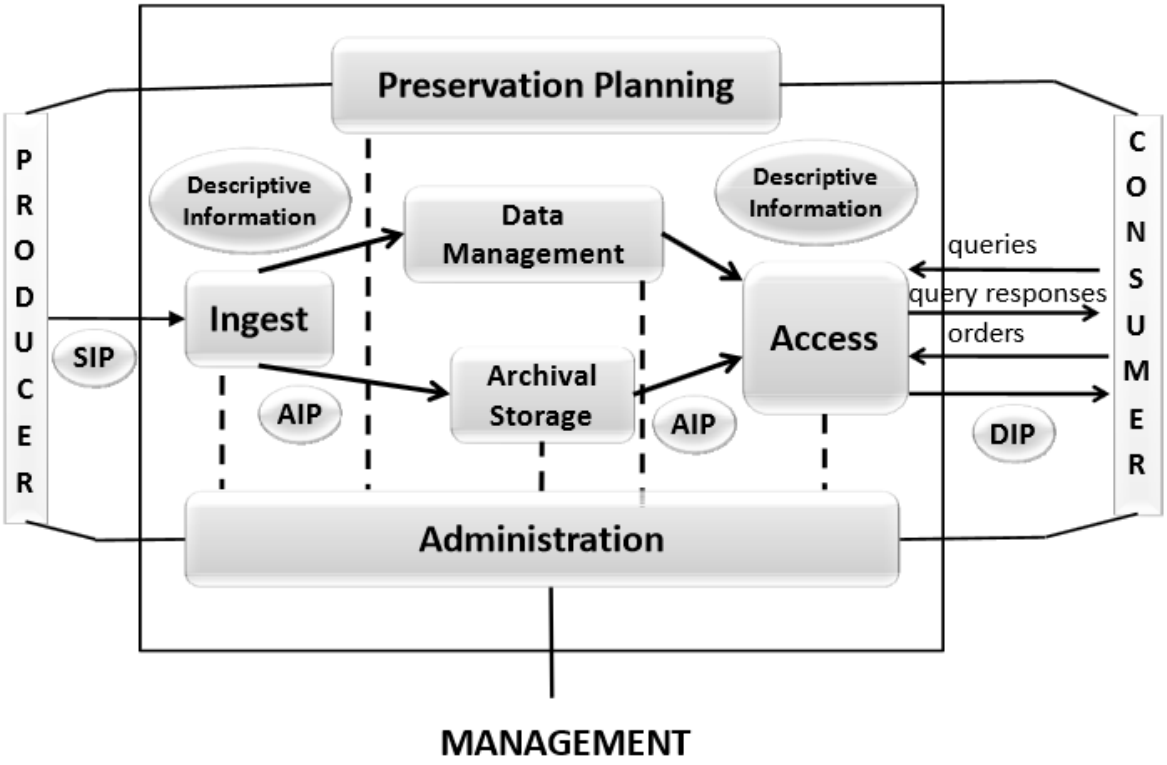

Figure 2 OAIS Reference Model

Focusing on the various packages within the OAIS reference model[5], the Submission Information Package (SIP), the Dissemination Information Package (DIP) and the Archival Information Package (AIP), a direct correlation between the cataloguing and data storage processes within TMS can be applied. The SIP can be considered the data ingestion process and from a collections perspective, the SIP information is first delivered to the Collection Managers and then entered into the database. Once cataloged, the SIP information becomes the DIP metadata. DIP information is what is made available to end-users. For TMS users, this would be the object record information for a given item in the collection. When appropriate, this information is also shared with the public end-users via eMuseum. Finally, the AIP information is often times a larger package of information containing the DIP metadata along with administrative, technical and preservation metadata. At WAM, archival batches of images are

[3] Harvey, *Digital Curation,* 34.
[4] Ibid, 34.
[5] The Consultative Committee for Space Data Systems (CCSDS), *Recommendation for Space Data System Practices: Reference Model for an Open Archival Information System (OAIS)*, (Washington, D.C.: CCSDS Secretariat), 44.

manually created where the metadata is embedded into the corresponding digital images, as well as stored in archive spreadsheets with the image files stored in sub-folders. These digital archival packages, grouped with a batch number, are stored in an external hard drive which acts as the visual archive. In the ideal Museum world, a Digital Asset Management system (DAM) can perform the final two information package steps for you, but this is the real world where not all institutions have a DAM available and a more hands-on creation of our archival batches of data is required. Again, because this is a *conceptual* reference model that I am following, the conceptual application to its function in TMS is more important than the other programs which might better facilitate this connection and work process.

File Name Organization

By following the conceptual guidelines of the OAIS Reference Model, while keeping in mind the various steps involved within these information organization phases through the DCC Curation Lifecycle Model, I am able to conceptually map the lifecycle of visual and textual data through TMS and its output through eMuseum. The success of carefully creating archival batches of the images and their corresponding metadata supports my claim that the photographic archive requires the same level of cataloging attention as the objects which they represent.

As this is an old institution with long standing policies, there were many challenges which I had to face in order to ensure proper implementation of my proposed organizational schema. These were the four core challenges:

A. Integrate this new layer of metadata about the physical print into TMS, as well as new metadata generated through the same print's digitization
B. Successfully distinguish between the born-digital images of art objects and their analog counterparts, which I need to also catalog
C. Apply a unique identifier system to these analog and digital instances
D. Educate my colleagues at the Worcester Art Museum to better understand this new organizational schema

What exactly do I mean by my last statement? Prior to my proposed changes in workflow and file naming processes, it was the status quo to merely assign the object number of the object photographed as the image file name. This is by no means a preposterous file naming convention, but it quickly became complicated once multiple digital iterations of the same image of an object had to be organized. Initially, some form of a suffix was added to the file name, which became rather lengthy, rather fast. Another example of the status quo was if an object received new photography, the new image file would share the same file name as the older one (i.e. the object number) and would replace the older image file, resulting in the deletion of the first image file. This is the problem with born-digital photography, it is too easy to delete the archival content rather than preserve the captured instance. With analog photography, you could not ignore the older images by replacing them with a newer image; the first print still survives.

To resolve this issue, I proposed a file naming convention that I adapted from a system used while interning at a neighboring Boston cultural institution. Referring to Figure 3, this new system acknowledges the existence of a born-digital image file alongside an analog counterpart print which has been digitized and cataloged into the database. When I catalog an analog print, it receives an assigned prefix, and then a unique identifier suffix. Once that print was digitized, it

receives a prefix of 'D-' appended to the pre-existing image file. Born-digital photography does not receive the 'D-' prefix as it is does not have an analog counterpart. After each unique identifier is assigned, the sequential numbers are carefully recorded in an Excel spreadsheet. This tracks the last number used in the assignment system, the date of that last use, and who was the last individual updating the spreadsheet.

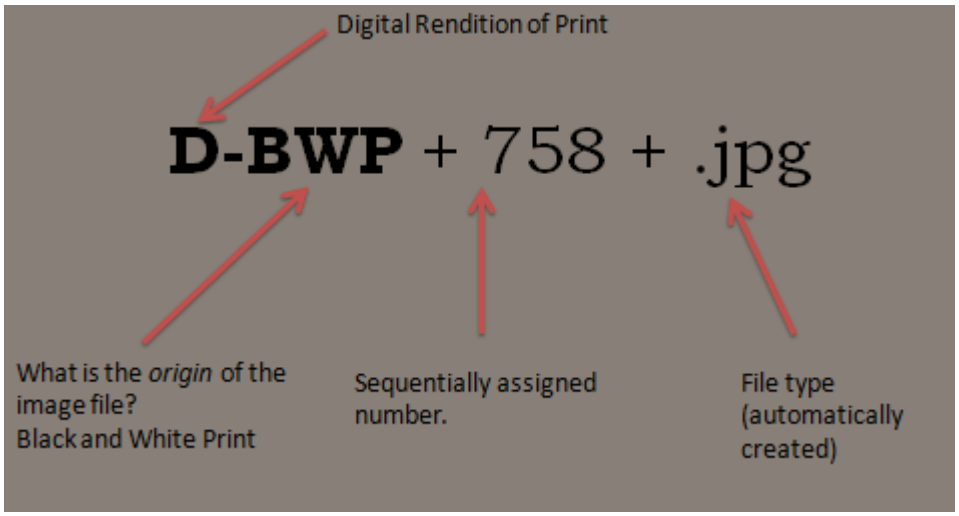

Figure 3 Example of new file naming convention.

The most common counterargument that I received from fellow staff was, "Why aren't we keeping the object number in the image file that it represents?" Here is my response: Because the image file is not *the object* that received its own unique identifier (e.g. 1910.20), but rather the image file is a *representation of the object*. If you want to keep the object number in the file naming convention, I am not opposed to that, but how do you articulate quality when you take new images of an object that already has photos? What do you do with the old images? They are now a part of the visual archive of the institution, so replacing the existing file is out of the question. *ALL* instances of photography need to be archived regardless of digital image quality. This is why a unique identifier system helps to clarify the possible guessing game of what is the better image when multiple options are available in your database.

FRBR

Now that we know how conceptual models can assist in the organization and dissemination of information, we can focus our attention on how to catalog these uniquely identified items into TMS. In order to understand the organizational "how" of it all, another conceptual model now comes into play, which brings me to the title of my talk, FRBR. What is FRBR? The Functional Requirements of Bibliographic Records (Figure 4) is an "ontology that captures and represents the underlying semantics of bibliographic information [which] facilitates the integrating, mediation, and interchange of bibliographic and museum information."[6] This conceptual model was created and released in the late 1990s by the International Foundation of Libraries and Archives (IFLA), as a means to account for relationships between different iterations of a work within an institution's catalog holdings. The best example is to think of the

[6] Chryssoula Bekiari, et al., *FRBR object-oriented definition and mapping from FRBR$_{ER}$, FRAD and FRSAD (version 2.1)* (International Working Group on FRBR and CIDOC CRM Harmonisation, Februrary 2015), 10.

children's book *The Wonderful Wizard of Oz*, and how you would relate all of the movies, spin-off books, and a Broadway musical that are directly influenced and related to the original book publication. This is what FRBR strives to sustain. What is depicted in Figure 4 is the basic diagram from Group One of Entity-Related FRBR, where there is a linear progression of relationships. Most of the various *Wizard of Oz* related material would be located at the Manifestation level. The FRBR model does not have much wiggle room for more granular interpretation about an object's creation.

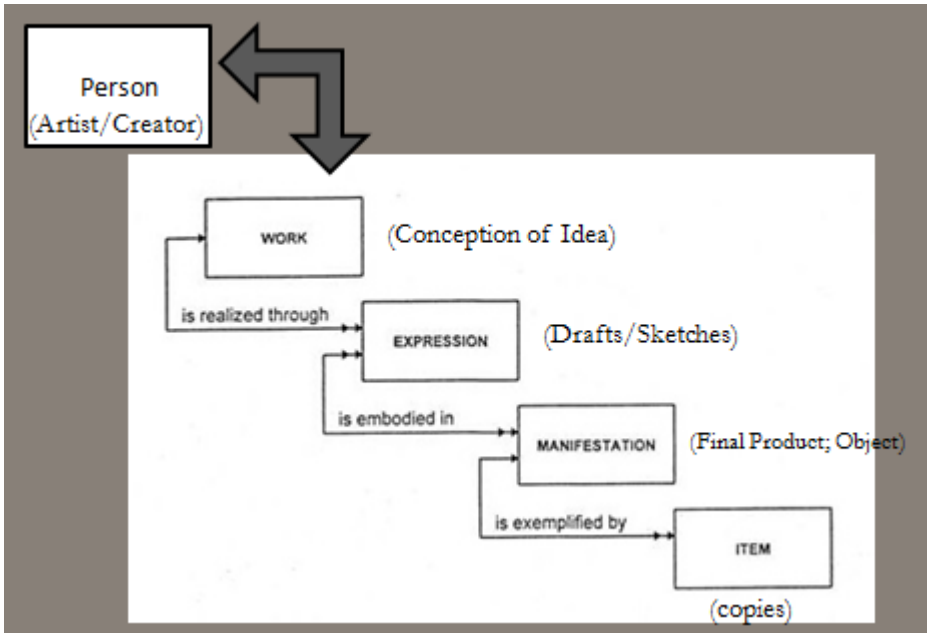

Figure 4 Adaptation of entity-relationship FRBR Group One Diagram.

Around the same time as FRBR's release, the International Council of Museums (ICOM) released their own Conceptual Reference Model (CIDOC CRM), designed for museum cataloging within databases. The similarities between FRBR and ICOM's CRM were too great to have them exist on their own, so a working group was formed in the mid-2000s in order to create a fusion conceptual reference model, working to merge the two together as a model which is applicable across all GLAMs.[7] The product of this working group collaboration is Object-Oriented Functional Requirements of Bibliographic Records (FRBRoo). GLAMs are all "memory systems" focusing on the same goal of sustainability into the digital future, ensuring that the analog components are not left behind. Neither conceptual model can stand on its own, and requires a content standard for cataloging in order to survive, such as Cataloging Cultural Objects (CCO), Categories for the Description of Works of Art (CDWA), Getty Vocabularies or VRA CORE 4.0.

Although it is still in its second phase with an updated draft recently released in February 2015, Object-Oriented FRBR is more appealing to work from within a museum setting because all of the different phases of the reference model use time as the central aligning factor (Figure

[7] ICOM, "FRBRoo Introduction," last updated February 2015, http://www.cidoc-crm.org/frbr_inro.html.

5).[8] Using time as a baseline for all factors of creation allows for more granular areas of cataloging, an aspect in which entity-relationship FRBR falls short. Another factor considered within FRBRoo, unlike entity-relationship FRBR, is the consideration of *what* is being created. Depending on the cataloging standards that your institution follows, time might not have to be accounted for in the creation process of an object. I, however, catalog the image files following VRA Core 4.0 (and RDA—Resource Description and Access), which is dependent on the value of time for an art object. From an object standpoint, for example, a woodblock can be considered an Expression of a Work (concept) where the Manifestation Production Type is a series of physical reliefs. Let me show you my interpretation and application of the FRBRoo's conceptual model to the photographic archive. (Please refer to Figure 6.)

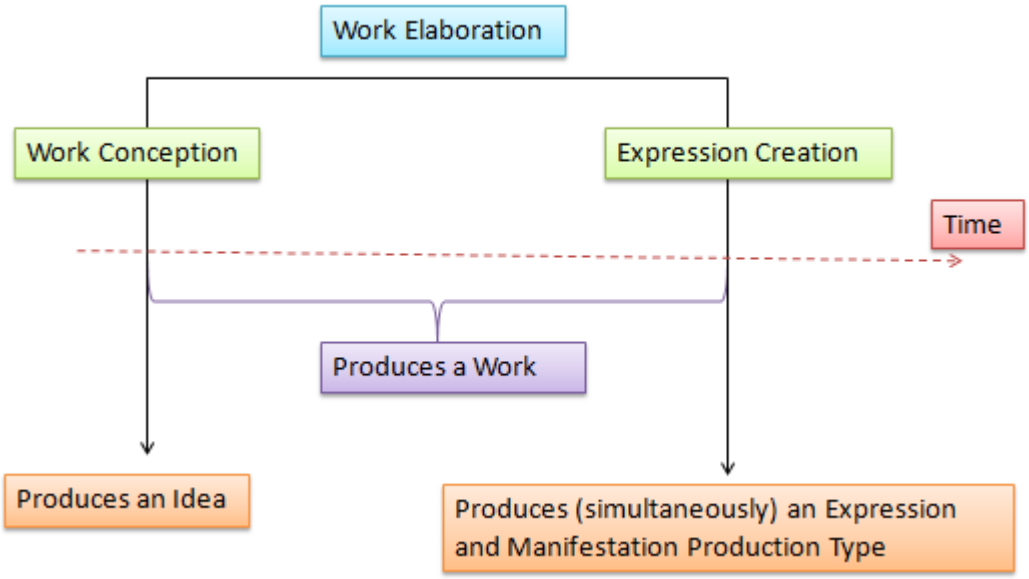

Figure 5 Adaptation of Diagram for "Work and Time," from Bekiari et al., page 14.

Within FRBRoo, it is acknowledged that Work can be interpreted as a conceptual idea of an artist, or the physical created instance by the artist; I consider it a physical item within our application in the database. We have our Work, a physical painting, and it has now been photographed onto a glass plate negative. The glass plate negative has been assigned a unique identifier of GNG139, and is cataloged as such within the database. We shall consider this negative as the Expression Creation (F28). Expression Creation can also be applied to the born-digital material because we consider Adobe Digital Negatives (DNGs) as our archival files. When developed, the negative has the potential to produce an infinite number of prints. Because so many types of "children" exist to the "parent" negatives, we will consider the prints and TIFF image files (created from DNGs) as different Types (E55) from Manifestation Production Type (F3), being sure to specify if it is a print, slide, celluloid negative, TIFF, etc. Finally, Item (F5) is the JPEG directly linked within TMS. All digital files will share the same unique identifier as the TIFF, but have metadata that reflect the relationship back to a DNG or parent analog print/negative.

[8] Chryssoula Bekiari, et al., *FRBR object-oriented definition and mapping from FRBR$_{ER}$, FRAD and FRSAD (version 2.1)* 13.

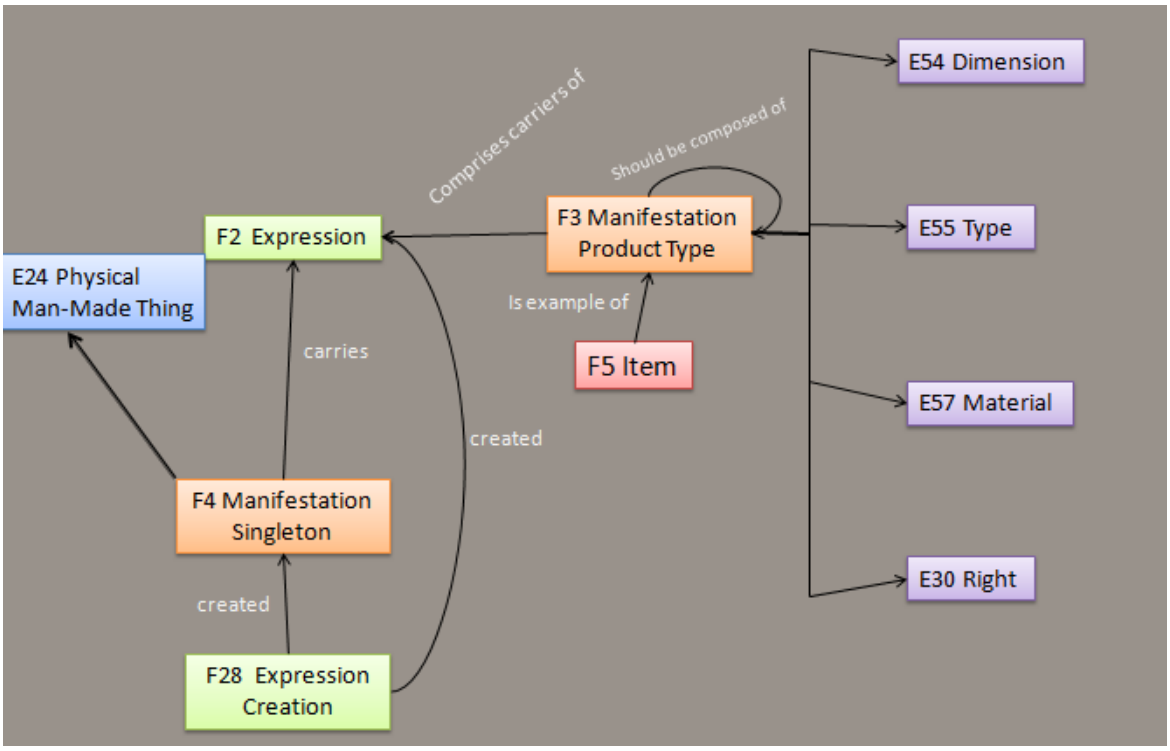

Figure 6 Adaptation from Diagram from Bekiari et al., page 21.

FRBR and TMS

Now that we are all Object-Oriented FRBR scholars and understand the relationships, let's look at how they apply within TMS. The biggest distinction that I wanted to make when cataloging these items is the difference in time and methods of creation. Time is important to distinguish because you may discover two prints, with the exact same angle, but with different lighting and aged photographic paper. On the back of the prints two clear dates are noted with each print. Even though the images appear to be the same, retaining and digitizing both instances informs the collection managers that between x and y date, no changes occurred to the piece. Methods are also significant to distinguish because you may have a newer image on a celluloid negative and an older image on a glass plate negative. The glass plate negative will yield far crisper details than the celluloid, even though the celluloid is newer, so it is important to acknowledge these differences by means of cataloguing.

Figure 7 depicts a record for a black and white print, which is cataloged based on information retrieved from the original photography sheet, documenting the type of materials and time used in order to create the negative, lighting sources, and most importantly who created the photograph and when. From a photographic archivist's standpoint, this is archival cataloging gold. I can also track where the analog print is housed within the archives by assigning a location through the Text Entry field in TMS. Once the negative has been digitized, the TIFF receives a prefix of "D-" in front of the analog print unique identifier, acknowledging that this is a digital version of the print. A new layer of metadata (see Figure 8) can then be neatly entered for this digital file, specifying when it was digitized, what equipment was used in the process, and who did it.

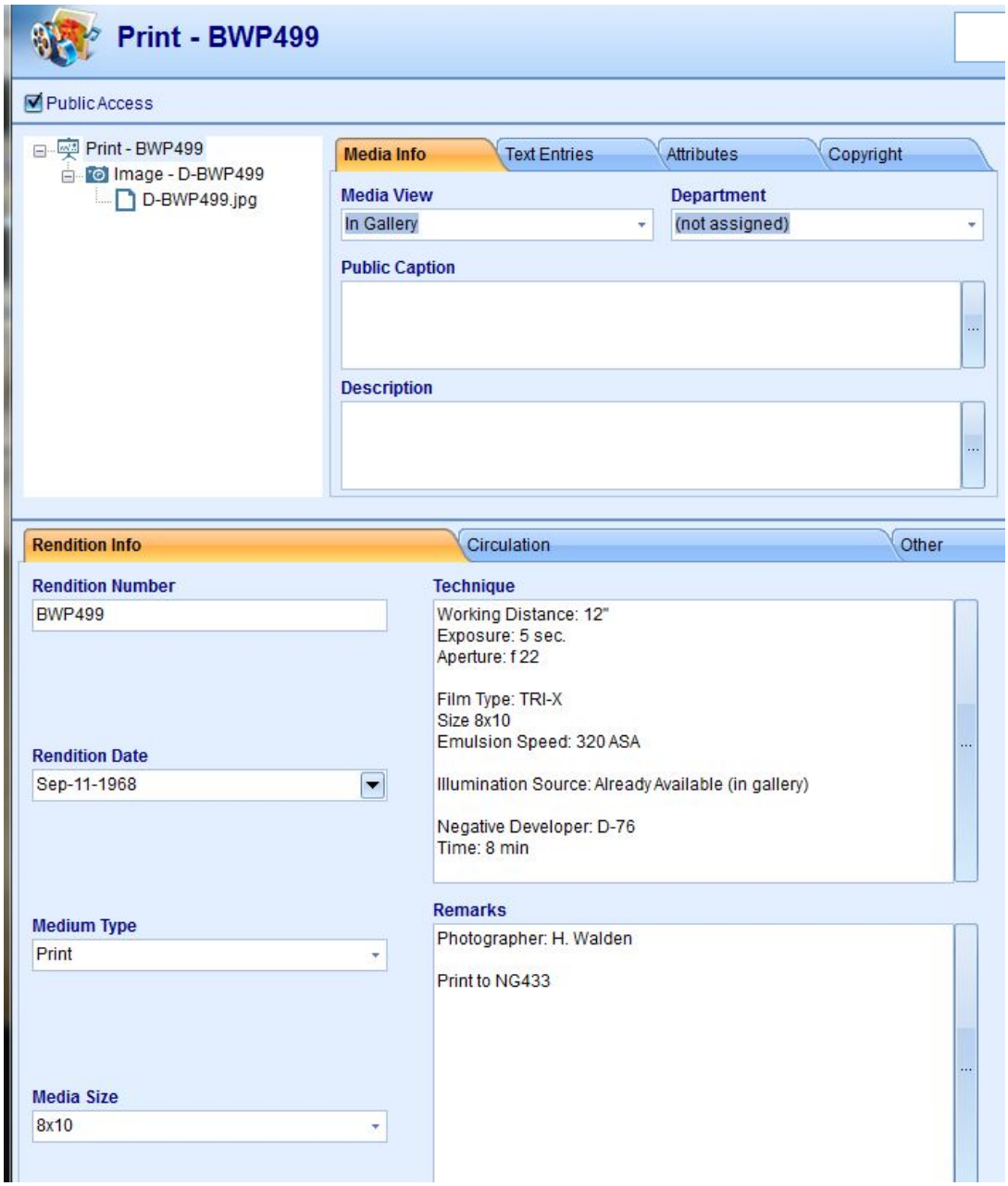

Figure 7 Media Rendition Record from The Museum System Database, displaying catalog information for a physical photograph.

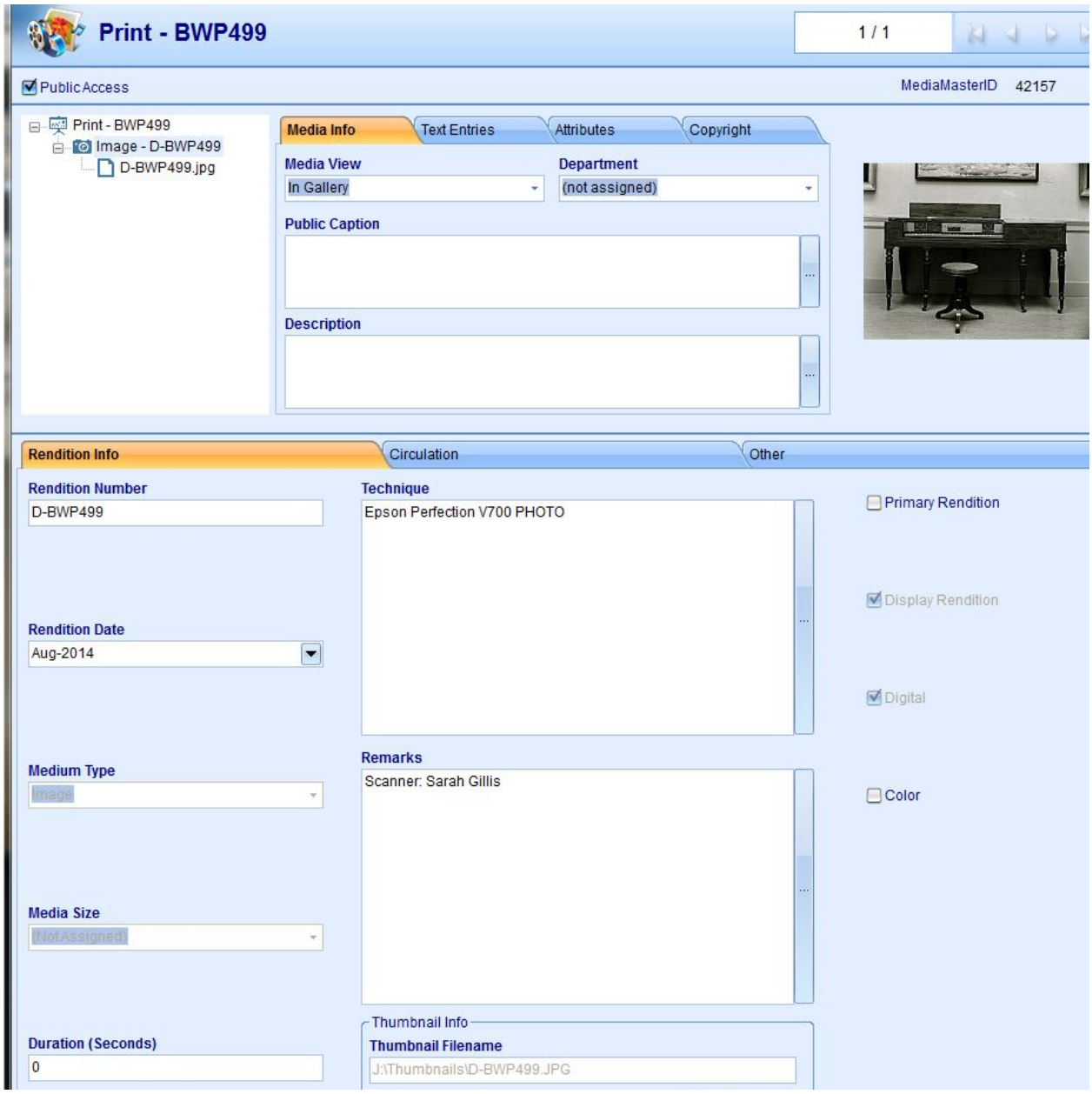

Figure 8 Media Rendition Record from The Museum System displaying catalog information for a digitized print.

Within the archival metadata section in TMS, I specify the TIFF as the digital archival original, because there is no DNG since it is an analog "parent". The one hurdle that I am facing at the moment is creating a solid, linked relationship between the negative and its print child. I prefer to add another child rendition under the Negative record, but that would reduce visibility to the size of the archive. Instead, the print and the negative have their own records in TMS, with their digital children linked to each record as necessary through text entry (please note that not all prints/negatives are digitized when they are cataloged). By doing so I am able to acknowledge their physical numbers in the database to other staff. I hope to find a solution as time and technologies advance.

Conclusion

Although seemingly complicated when discussed, I hope that you walk away with a stronger understanding of how conceptual models like the DCC Curation Lifecycle Model, OAIS Reference Model, and Object-Oriented FRBR directly apply to the care and maintenance of museum holdings, including archival material that support the objects themselves. By following these models, we are expanding the horizons of data discovery within an institution. Keep in mind, though, that these conceptual models are directly contributing to the foundations for linked data across an institution's search and discovery systems. FRBRoo is specifically designed so it can be coded into RDF (Resource Description Framework) for linked operability between a standard library OPAC system and a museum collection management system. That way, if you discover a book resource which pertains to a particular object in the permanent collection of a given institution, by linking the data together, a user could then discover more information (including images) about the work cited within the book resource. By linking data cultural institutions will enhance discovery and sharing among information seekers at an international scale. In order to move into this world, the first step is laying the foundation with conceptual models.

Bibliography

1. Bekiari, Chryssoula, Martin Doerr, Patrick Le Boeuf and Pat Riva. *FRBR object-oriented definition and mapping from FRBR$_{ER}$, FRAD and FRSAD (version 2.1).* International Working Group on FRBR and CIDOC CRM Harmonisation, Februrary 2015.

2. Harvey, Ross. *Digital Curation*. New York: Neal-Schuman Publishers, 2010.

3. ICOM. "FRBRoo Introduction." Last updated February 2015. http://www.cidoc-crm.org/frbr_inro.html.

4. The Consultative Committee for Space Data Systems (CCSDS). *Recommendation for Space Data System Practices: Reference Model for an Open Archival Information System (OAIS).* Washington, D.C.: CCSDS Secretariat, June 2012.

Links

Cataloging Cultural Objects (CCO): http://cco.vrafoundation.org
Categories for the Description of Works of Art (CDWA): http://www.getty.edu/research/institute/standards/cdwa/
Gallery Systems, The Museum System, eMuseum: http://www.gallerysystems.com
International Council of Museums (ICOM): http://icom.museum/
OAIS Reference Model: http://public.ccsds.org/publications/archive/650x0m2.pdf
VRA Core 4.0: http://core.vraweb.org
Worcester Art Museum: http://www.worcesterart.org
Worcester Art Museum Collections Search: (link)
DCC Curation Lifecycle Model: http://www.dcc.ac.uk/resources/curation-lifecycle-model
Object-Oriented FRBR: http://www.cidoc-crm.org/frbr_inro.html