BIBFRAME AV Modeling Study: Defining a Flexible Model for Description of Audiovisual Resources

Submitted May 15, 2014
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1   Introduction

Organizations responsible for the collection and provision of access to resources—libraries, archives, museums, historical societies, as well as corporations, film studios, television stations, scientific laboratories, etc.—all share the common goal of enabling materials to be discovered, located, and used by their relevant communities. Description of any resource for the purpose of discovery aims to answer a common set of questions: Is this the resource the user is seeking? Where is it? Who made it? What is its content? Will the user be able to distinguish between resources with similar characteristics?[1] Once a resource has been identified, can it be accessed, and if so, how or where? In addition to the basic user tasks of finding, identifying, selecting, and obtaining content in a catalog, additional, optional questions may also be asked in some cases: What were the circumstances of the work's creation? What additional resources may exist that will assist in contextualizing the content? What are the details of the format(s) on which this content is contained?

As catalogers have encountered an increasingly wide variety of resource types over the years, decisions about how to describe diverse content in support of discovery and access have become more difficult. Consequentially, various communities have developed independent content descriptive approaches specific to certain content types and formats. As these approaches are applied to a common data model, search and discovery challenges in library catalogs have become common.

Audiovisual resources provide a case in point. Description and access of content contained on time-based media has been a daunting challenge for many decades, as catalogers have struggled to apply a data model predominantly designed to describe published books to these resource types. This has been particularly difficult in the case of original and unique moving image and recorded sound material within libraries and archives, which are often described poorly, if at all, and are challenging for researchers to access. The 2012 Library of Congress National Recording Preservation Plan highlights this issue for audio, warning,

Scholars who use sound recordings in their research have indicated their difficulties in

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[1] Examples from the audiovisual community:
1) A user wants to see the movie Dracula starring Bela Lugosi. When she goes to the library, she first wants to find out if the library has it, then wants to make sure that the library has the version she wants. Once she has determined that the library does have the version she wants to see, she then makes sure it isn't a VHS copy because she does not have a way to play VHS at home. She narrows her choice to the DVD copy, locates it, then checks it out.
2) A user is interested in finding the song he heard on the radio for the first time driving into work that morning. He did not quite catch the title, but did catch that the artist was Peter Frampton and the song had the phrase "do you feel" as part of the title. When he goes to the library that evening, the user first does a broad keyword search "Frampton do you feel" and does get a couple of results: a 2012 compilation CD of rock classics with the song "Do you feel like we do (Peter Frampton) (live)" and the original recording re-mastered of the album *Frampton comes alive!.* The CD includes the song "Do you feel like we do." The user chooses the CD of the live album after doing additional online research to learn that *Frampton Comes Alive!* was a seminal live album originally issued in vinyl in 1976.

> *locating relevant materials. The problem of discovery extends across the full spectrum of recorded sound collections, including best-selling commercial recordings and unique un-published recordings, and is particularly acute in the case of special and private collections. The problem is structural and stems in part from cataloging practices that do not sufficiently address issues of access and preservation that institutions might resolve through a collaborative effort.[2]*

A data model flexible enough to meet the needs of published and unpublished, time-based and static, independent and collection-based materials, object-centric and event-centric description, and also enable and improve search and discovery, is highly desired across collecting communities. The development of a replacement encoding and expression standard for MARC provides a unique opportunity to identify and support the requirements of moving image and recorded sound cataloging, as well as other content types that fall outside the published book model, from the outset. A model that additionally utilizes the architecture of the web, enabling new opportunities for search and discovery, is also required, so that resource description can become more modular, portable, and interoperable with other standards and datasets available for specific content types across communities. These are the goals of the Bibliographic Framework Initiative (BIBFRAME).

This report, commissioned by the BIBFRAME team within the Network Development and Standards Office at the Library of Congress, aims to identify the content description needs of the moving image and recorded sound communities and specify how those requirements can be met within a semantic bibliographic data model designed generically to support all content types found in libraries. Specifically, the objectives of this report are to:

1. Provide an overview of the current landscape of cataloging content models for moving image and recorded sound, and examine these in relation to Functional Requirements for Bibliographic Records (FRBR) and as adopted by the Resource Description and Access (RDA) content standard.

2. Propose a generic content model, which factors in the requirements for audiovisual content types, and aligns to existing models where possible.

3. Propose changes to the BIBFRAME model and vocabularies that will facilitate the description of moving image and recorded sound content in a way that enables catalogers to utilize the content standards of their choice, improve on those content standards where there are gaps or inconsistencies, and ultimately enhance search and discovery of audiovisual content.

Characteristics of Moving Image and Recorded Sound Content

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[2] Council on Library and Information Resources and the Library of Congress. *The Library of Congress National Recording Preservation Plan.* December 2012,The National Recording Preservation Board, p. 38. Accessed 9 May 2014 from http://www.loc.gov/rr/record/nrpb/PLAN%20pdf.pdf

The broad category of moving image and recorded sound represents more of a mode of creation and access than a particular type of content. The landscape of content types that are represented by audiovisual resources varies enormously, as identified in the lists below. These examples are far from exhaustive, but represent many of the common types of time-based resources found in library and archive collections.

Moving image content includes published and unpublished content of many types:

- Feature films, with materials ranging from the various production elements that go into making a film (sound reels, camera originals), to products of the preservation process (internegatives), to commercial releases and re-releases on consumer formats. In addition, materials for marketing the release of a feature film are typical in libraries and archives, particularly posters, trailers and electronic press kits.
- Television productions, which again may include the various production materials. Television broadcasts may be captured live (sports, news, political public affairs, reality competition, award shows, etc.), or edited productions (news magazine, fictional episodic programming, game shows, commercials, variety, documentaries, made for TV movies, etc.)
- Avant garde and artistic works
- Documentation of live events (performances, conferences, speeches, workshops)
- Documentation of research or scientific studies
- Documentation of natural or man-made phenomena
- Training and educational materials
- Home movies and home video
- Mashups, remixes, and user-generated web video
- Oral histories and interviews

Recorded sound content also includes published and unpublished content such as:

- Studio music, either in commercial releases on various consumer formats, or master production material, of a wide variety of musical styles (classical, opera, pop, jazz, traditional, ethnic, etc.). This type of content may include studio masters with one or more takes for a given track.
- Live recordings of music performances, either in original form or commercial release
- Albums that contain both live and studio performances, which may have been public or private (e.g. personal home recordings) performance events
- Radio broadcasts such as news, talk, sporting events, drama, comedy, etc.
- Documentation of live events (performances, conferences, speeches, workshops)
- Production elements and/or finished artworks and soundscapes
- Documentation or field recordings of various forms of human expression: traditional/ethnic musical styles, religious events, rituals and ceremonies, etc.
- Natural and environmental sounds
- Sound tracks associated with moving image content

- Training and educational materials
- Oral histories and interviews
- Audio versions of books, audiobooks (special productions of material originally in textual form performed like a play or radio drama), and talking books (specifically for the blind community).
- Recorded monologues, reminiscences, etc.
- Mashups, remixes, etc.

While the contents, circumstances of creation, and uses of these materials vary greatly, they share many common characteristics simply by virtue of their time-based nature and the creative allowances that these media provide. Several are described below. Not all of the characteristics listed here are unique to audiovisual content, nor do all audiovisual resources exhibit each of these, yet they are typical of this type of resource and important to understand when considering requirements for search, description, and use of audiovisual media in collecting institutions.

Time-based

The time-based nature of moving image and recorded sound content is what sets these materials apart from other resources. By virtue of this characteristic, audiovisual resources almost always capture live action (with some exceptions including animation and computer-generated works), or what the viewer/listener perceives as live action/real-time events, and therefore the relationship of the content to an event or action that took place in space and time is often important, as is the action of capturing that event through a device and fixing it to a carrier. This characteristic means description of time-based content often necessitates an event-centric approach, rather than a strictly work- or object-centric one. The event-centric nature of time-based media and requirements for event description is not necessarily centered on a single event or action, but can be represented by a continuum of activities that results in a product for publication or exhibition. Audiovisual archives in particular collect materials that are representations of the creative process, such as raw footage and outtakes from a feature film or multiple takes recorded of a particular song. These activities do not always result in the completion of a work that is realized in a particular medium, yet are often of interest to scholars studying the working style of a particular filmmaker or performer.

By extension, just as the capture or creation of audiovisual content is performed through a machine, accessing time-based media necessitates playback through devices that can deliver content appropriately (e.g. at the right speed, with the appropriate bitrate, aspect ratio, color, etc.). While machine dependency is not unique to time-based media, it is an un-extractable attribute of audiovisual resources. Understanding the specifics of how content should be delivered to users enables the appropriate choice of playback device and settings, and therefore is an important aspect of audiovisual resource description.

This dependency also means that, unlike resources that do not require machine remediation for access, audiovisual resources must periodically experience preservation intervention due to

format obsolescence. As a result, the relationship of a given accessible copy of a content item to the original format is important for collection managers and researchers alike to understand, as changes in format can impact aural and/or visual presentation. Although it is commonly acknowledged in the audiovisual community that the target of preservation is the content, rather than the carrier, properties such as frame rate and aspect ratio are often integral to the content's persistence through formats and generations. Preservation and access are therefore intertwined for audiovisual material.

Multiple Creators/Contributors

The creation of time-based media is rarely the product of a single "creator." Unlike the case of printed materials, which are typically the product of one or at most a small handful of agents, who generally share the same role (e.g. multiple authors of a book or journal article), the creation of a typical studio album, film, television, or radio program can involve several personal or corporate agents performing various functions in the creation of content. Depending on the type of content, the roles of these "primary" agents might include performer, screenwriter, director, producer, editor, cameraperson, actor, speaker, composer, recording engineer, interviewer, etc. There are many more additional agents who might be considered additional "contributors." Other agents fulfilling a wider range of roles may also contribute to the creation, but be considered "additional" agents. Therefore, identifying the primary "creator" and supporting "contributors," for this content, as is often required in library cataloging, is very challenging, and can lead to inconsistent or even misleading descriptions.

Uniqueness

A notable characteristic of moving image and recorded sound collections in libraries and archives is they often contain unique materials. The 2012 Library of Congress National Recorded Sound Preservation plan points out that, "most of the 46 million recordings housed in public institutions in the United States never have been published. Most unpublished recordings are unique."[3] The March 2014 draft of the Moving Image Cataloging Manual of the International Federation of Film Archives emphasizes a similar point and describes the important conceptual differences between archival moving image cataloging and cataloging of other resources in libraries. The authors note that the traditional shared bibliographic model found in library cataloging, which focuses on describing exact copies of the same publication, does not apply well in moving image archives. They stress that, "moving image archives are less likely to contain copies of the same manifestations, and thus have been less interested in sharing records per se than they have been in providing access to their rare and unique holdings for...preservation or collection development. These functions of a catalogue for moving image archives therefore go beyond the functions of a catalogue in libraries to meet many of the

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[3] Council on Library and Information Resources and the Library of Congress, p. 44. The report cites a reference to these figures from a response submitted by a Society of American Archivists representative to a Notice of Inquiry regarding the protection of pre-1972 sound recordings. See for more information: http://www.copyright.gov/docs/sound/comments/initial/20110124-Society-of-American-Archivists.pdf

collection management needs of archives."[4]

Aggregations & Collections

Another important characteristic of moving image and recorded sound resources is their tendency to be manifest in the aggregate or collections. A common example of an aggregate resource is an album with multiple tracks. While in some cases the album itself is considered the work, in others, the album is considered an aggregation of several works, the individual tracks, not dissimilar to articles in a journal. These works typically have distinct creators and titles, and are regularly repurposed in new aggregations (compilations, re-issues with new tracks, inclusion in a television commercial, etc). In radio broadcasting, story reels— compilations of several news stories, either in the form of a finished news magazine program or simply the raw stories—are quite common. Similar content can be found within television collections. Recorded sound catalogers stress the importance of being able to describe works at both the track and the aggregate level. This situation is further compounded in the case of items like box sets, which contain individual albums representing many or all of an artist's earlier releases.

Similar to recorded sound collections, moving image collections encounter aggregates: compilation reels of various short films or videos, excerpts of other titles on a work, and remixes are quite common. Compilations of several television episodes spanning a season, an entire series, or selections are now very common for DVD releases, as are feature film compilations of works around a particular actor, director, studio, theme or topic.

Also typical in film and television archives are collections of original production elements (camera originals, sound tracks, edits). Recorded sound collections similarly might include a diverse range of material: original studio recording takes as well as commercial releases of an album, raw audio capture, various production releases of that content, as well as preservation materials.

Finally, there are common examples of works that span multiple carriers. Distribution prints of feature films, for instance, typically require several individual reels. Audio recordings, depending on the format, can span multiple sides or multiple discs/reels. Oral history interviews can sometimes take several hours, or even days, requiring multiple moving image and/or sound carriers to capture the entirety of the interview. Oral histories may contain a mix of both edited and unedited material and multiple camera angles. It is common in the making of documentary or nonfiction biographical films and news magazine programs to conduct interviews of subjects that are then edited to fit into the context of the story or particular time slot. These uncut filmed interviews often span over several carriers and become important historical documents in their own right that can make their way into archives. The same situation is found in the case of radio documentaries, in which unused material might be part of the aggregated archival material for the show, and could even be compiled into outtake reels.

[4] International Federation of Film Archives, "FIAF Moving Image Cataloguing Manual," draft version 1.5.1, March 2014, p. 8

Multiple Generations & Uses

Collecting institutions that hold unique audio and moving image elements are required to periodically migrate the content to different media types so that they remain accessible on contemporary playback devices. As a result, over time the same content can often be found on many different items, and the relationship between these is not always one-to-one. For example, content on a lacquer audio disc might have been transferred to ¼" open reel (an accepted preservation format at one point), but because open reel can carry much more content than the original lacquers, the content from other lacquers discs were copied to that same reel as well. The relationships between items become complex in these cases. Now that the need to reformat to a widely adopted digital file format is essential, it might not always be possible to go back to the original copy. In addition, the preservation format is almost always different than the access format, which may in fact change more frequently over time than will the preservation format.

Film provides another example. To be preserved photochemically, new internegatives and prints are made from the best available source, which may be either a print or negative along with potentially other elements (sound tracks, workprints, etc). This process results in multiple generations of the film, each of which demonstrates some loss of resolution from the original, but will be of higher quality than the source overall due to conservation practices such as restoration, cleaning, and color correction. Today, digital scans and access copies created from physical film elements will similarly have complex relationships to their source material.

Summary of Requirements for a Content Model for Audiovisual Resource Description

The characteristics described above point to several requirements for a content model that supports audiovisual resource description across the landscape of content types. These can be summarized as follows:

- Apply equally to published and unpublished material
- Allow for a work- or event-centric approach to content description
- Allow content to straddle the line between work- and event-centric for those communities which classify data points differently or when the presented information does not clearly center on one element or the other
- Allow separate descriptions of content and carrier, with (potentially complex) relationships between these
- Enable description of collections and aggregates and the relationships to items contained within these
- Be flexible enough to support a wide variety of content types
- Enable easy identification of content types by catalogers and end users, to an appropriate degree of granularity (e.g. audio: spoken word, moving image: episode)

- Support the description of related content instances that indicate their generation, use, and relationship to one another
- Enable the description of content re-use and re-purpose that allows relationships between original and new content
- Allow for the description of original artistic intent (such as silent/sound, color, aspect ratio, frame rate, key) as attributes of the content, as appropriate
- Enable the expression of complex relationships between content (e.g. master recordings to commercial releases, "webisodes" to television episodes, raw news to final broadcast, etc.)
- Allow for a level of descriptive granularity appropriate to the content and institutional context
- Support description of technical characteristics of carriers to enable authentic access and preservation

These requirements are explored in further detail throughout the remainder of the report.

2   Comparative Analysis of Existing Content Models

A generic data model that supports the needs of audiovisual resources must allow for the description of content and carriers in a way that supports collection management, captures the salient characteristics of the media, describes the content appropriate to user needs, and yet is flexible enough to apply to description and discovery of other resource types. A comparison and examination of content and structural standards as well as additional frameworks used in relevant communities that have been referenced or implemented for the description of audiovisual resources provides a useful starting point in the development of such a model.

- Functional Requirements for Bibliographic Records (FRBR)
- Resource Description and Access (RDA), including recommendations for its application for specific content types such as Best Practices for Music Cataloging by the RDA Music Implementation Task Force, Bibliographic Control Committee, Music Library Association.
- The papers of the Online Audiovisual Catalogers (OLAC) Moving Image Work-Level Records Task Force
- International Federation of Film Archives (FIAF) Cataloguing Manual
- Variations3 Metadata developed by Indiana University
- The <indecs> metadata framework (indecs)
- Others as appropriate, including Dublin Core, PBCore, EBU Core, Europeana Data Model, and Schema.org

The evaluated standards, papers and guidelines generally consider published or commercially distributed moving image and record sound content. As an example, FIAF attempts to model all moving image content, yet in reality, the manual takes a heavy slant towards the description of theatrically released feature films and commercially distributed television, not unlike *Archival Moving Image Materials: A Cataloging Manual*, 2nd edition (AMIM2). Neither standard provides adequate instructions for the description of filmed performances, music videos, oral histories,

interviews, speeches, and artists' works and video. AMIM2, originally developed as an extension to AACR2 Chapter 7, remains in use by the Moving Image Section at the Motion Picture, Broadcasting and Recorded Sound Division (MBRS) of the Library of Congress for the description of archival moving images.

Similarly, the Variations model is heavily focused on recorded classical music, and though it is largely extensible to other forms of popular music, it does not necessarily extend well to ethnic music, interviews/oral history, radio talk or news programming, recordings of natural or man-made phenomenon, actuality, surveillance, or art works. No content models/standards other than Variations were analyzed for recorded sound description simply because there are not any available within the library community. Although there have been significant cataloging and search challenges for recorded sound in libraries, these communities have in large part modeled their guidelines within general content standards such as AACR2 and RDA and have applied those approaches to MARC, rather than develop separate approaches,[5] although recommendations thus far have proven to be inadequate and limited to only specific content types.

Standards from outside the library community are included for several reasons. First, models developed for different uses and contexts might inform the development of approaches for libraries. Furthermore, there may be a desire among catalogers to align their practice with other content and structure standards available within various AV communities for the purpose of increased interoperability and data exchange, especially when libraries and archives are collecting resources and metadata from broadcast, music publishing, film distribution, or other creative industries that might incorporate very different data models than those found in libraries.

indecs provides a point of view of an applicable content model for these resource types largely from the perspective of the media creation and distribution industries. indecs has given rise to several industry standards, including Digital Data Exchange (DDEX)[6] for sound, the Entertainment Identifier Registry (EIDR)[7] for moving images, and ONIX for publishing, just as FRBR has informed the development of content and structure standards for the library and archives community, and the CIDOC Conceptual Reference Model has provided the basis for practices in the cultural heritage community.[8]

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[5] There is a standard created by IASA for Sound Recording cataloging which is more of a best practice model, but it is not widely adopted in libraries (especially in the United States), and amounts largely to an adoption of the AACR2 library worldview, as stated by the authors: "The IASA Cataloguing Rules are designed to harmonise with the Anglo-American Cataloguing Rules. - 2nd ed., and the International Standard bibliographic description (Non-Book Materials) and to be able to be used in MARC or other cataloguing systems." See http://www.iasa-web.org/cataloguing-rules/00-scope-purpose-and-use for more information.

[6] http://www.ddex.net/

[7] http://eidr.org/

[8] It should be noted that FRBR and similar models such as indecs and CIDOC have made little impact on the archival community. This is important to consider in the context of moving image and recorded sound materials, as these often straddle the line between archival and library collections, and therefore content standards such as DACS can often be important when describing archival audiovisual collections. DACS

Other evaluated models include PBCore and EBU Core/AES60, which primarily serve broadcast communities; EN 15097 Film identification - Enhancing Interoperability of Metadata - Element Sets and Structures, from the film archive community; and specific models, such as that developed for the *Discography of American Historical Recordings (DAHR)*, for online and print discographies (see a detailed discussion of this data structure in **Appendix B**). Finally, standards that have emerged in large part to facilitate discovery of resources on the web, such as Schema.org, Europeana Data Model, and even Dublin Core can provide relevant contrasting or supporting points of view.

As many of these models consider or reference the Functional Requirements for Bibliographic Records (FRBR) or evolved independently but in parallel to FRBR (e.g. indecs, Variations), it is useful to examine how these standards and structures align with or interpret the FRBR model. For standards not explicitly modeled in terms of FRBR, relevant approaches to entity definition are examined.

FRBR	indecs	RDA	FIAF	OLAC	Variations3
Work	Abstraction	Work	Work	Work / Primary Expression	Work
Expression	Expression	Expression	Variant		Instance
Manifestation	Manifestation	Manifestation	Manifestation		Container
Item	Item	Item	Item		Item
Person, Family, Corporate Body	Agent	Person, Family, Corporate Body	Agent	[roles]	Contributor
Event		Event	Event		
Place	Place	Place			
Content	Abstraction, Expression	Content	Content		Instance(s)
	Format				

Table 1. Loose equivalences among primary entities identified by various cataloging standards

While at first glance there appears to be overlap between the entities defined by these various guidelines, there are in fact important conceptual differences when the same term is used at the same level: expression in FRBR and RDA is not equivalent to expression in indecs. On the surface this might not appear to have much impact on how the models are practically applied.

was not discussed in this report as it does not provide guidance on physical and technical description of non-textual archival materials, although such guidance is under development.

However, a closer inspection reveals that the definition and interpretation of these entities greatly impacts the attributes that are defined or allowed for each. Examples are provided in the discussion that follows. For the purposes of this report, the examination that follows will focus on how content-agnostic standards, such as FRBR and RDA, are intended for audiovisual content.

Work / Expression

FRBR / RDA

FRBR and RDA could be considered hierarchical work-centric models, in that they identify **work** as the top-most entity applicable to a resource's description. FRBR defines a work as, "a distinct intellectual or artistic creation,"[9] and **expression** as, "the intellectual or artistic realization of a work in the form of alpha-numeric, musical, or choreographic notation, sound, image, object, movement, etc., or any combination of such forms."[10]

By definition FRBR and RDA envision that expression descriptions would inherit from their associated works, and therefore at the work level provide attributes that would be shared amongst all expressions of the same work. These work level attributes include date, intended audience, history of the work, relationships to the primary creator, subject headings, and relationships to expressions. In RDA, the expression entity does not allow for the inclusion of information such as title or subjects, as these would be described at the work level. The expression entity does provide the opportunity to give details about the particular realization, which for audiovisual materials could include content type, duration, language (which is not permitted at the work level), and whether or not there is sound in the case of motion picture films. Relationships to persons, families or corporate bodies at the expression level are used to describe contributors to the expression beyond the primary creator. It is notable that RDA does consider certain performances as types of expressions, providing a content type vocabulary that includes performed music, sounds, and spoken word. However, this model strictly limits these types to expressions of works. As will be demonstrated, RDA does not provide any recommendation for descriptions of "live" expressions when they are not embodiment of works in the formal sense, but another type of content. The issue of expression of non-work content will be further explored throughout the report.

FIAF

The moving image community has been very vocal about their different interpretations of work and expression from that of FRBR/RDA. In fact, the FIAF cataloging manual, along with the structure standard EN 15907 propose to replace the concept of expression with a **variant** entity**.** The distinction here is more than semantic; it is in fact a reimagining of the FRBR entities for moving image materials.

[9] IFLA Study Group on the Functional Requirements for Bibliographic Records, "Functional Requirements for Bibliographic Records: Final Report" International Federation of Library Associations and Institutions, February 2009, p. 17. Accessed 14 May 2014 from http://www.ifla.org/files/assets/cataloguing/frbr/frbr_2008.pdf
[10] IFLA Study Group on FRBR, p. 19

The definition of work provided by FIAF is one that, "Comprises both the intellectual or artistic content and the process of realisation in a cinematographic medium, e.g., what it is called, when it was made, who made it, who was in it, what it is about, etc. A Work as a conceptual entity is the topmost level of description. It may be published or unpublished, complete (whole) or incomplete (unfinished or missing content), edited or unedited. It is intended to function as the "node" that relates all Variants and Manifestations of a Work to a common creation."[11]

A variant is thus defined as, "an entity that may be used to indicate any change to content-related characteristics that do not significantly change the overall content of a Work as a whole. Such Variants can be produced by minor additions, deletions or substitutions to the content."[12] In this sense, variants are less common and not required, whereas in the FRBR/RDA model, all works have at least one expression.

Given these entity definitions, FIAF recommends that the relationships to agents at the work level include all of the creators and contributors that participated in the realization of the work: directors, editors, writers, music, producers, cast, etc. They stress that the creation of moving image content is in many cases the effort of many agents in different roles, rather than the product of one or two primary creators as specified by RDA. This has been a source of confusion for moving image catalogers who have trouble conceiving of the primary creators of a motion picture work as the screenwriter, director, or filmmaker only. Notably, the split in RDA with principal creators associated with the work and contributors associated with expression is not consistent with transcribing a statement of responsibility where the principal creator may actually be a production company, or in the case of raw news footage for television and radio, the cameraman, the reporter, producer, or engineer.

OLAC

Another interpretation of FRBR by the moving image community is provided by the Online Audiovisual Catalogers (OLAC), which collapses the concepts of work and expression into one single entity, which they call *work/primary expression*. OLAC finds that there is a very close relationship between a moving image work and its form at the time of its first release (or original form if not released), which should be captured as a work/primary expression. They find that this approach allows for description of re-use more easily, allows expression of information common to all versions of the content, and supports users' needs to understand important aspects of the original, such as whether the original release version was color or black and white. Changes to the content, such as those identified by FIAF as constituting a variant, would in OLAC's model simply signal the creation of a new work/primary expression with a relationship to the original. For this reason, OLAC recommends a more granular set of attributes for the work level record than do any of the other models, including several technical attributes. They argue that, "although values such as color and aspect ratio are not commonly used to identify moving image works, the value of such attributes for a particular expression is only completely

[11] FIAF, p. 18
[12] FIAF, p. 20

meaningful in the context of the original or intended value."[13] This recommendation is more or less consistent with the requirement described above that certain technical attributes of the original are as important as the subject matter in order to comprehensively understand a resource for the purpose of access or preservation.

Variations

The Indiana University Variations project series developed a work-centric model for describing recorded sound content independently of FRBR.[14] Nonetheless, the Variations data model aligns the concept of work closely with that of FRBR/RDA, defining it as, "the abstract concept of a musical piece or set of pieces," and the attributes it articulates largely map to those defined by RDA. Variations does extend the description of works by identifying several additional attributes specific to music content at the work level, including additional dates (date of composition, date of first performance, date of first publication), instrumentation, and languages.[15]

The closest parallel to the FRBR/RDA concept of expression in the Variations data model is ***instantiation***, defined as, "a manifestation of a work as a performance or a score." Instantiation attributes are those that deviate from the work by describing a specific performance or other realization of a work, and those that are changeable, such as instrumentation. The instantiation entity also incorporates a title, which does not have an equivalent at the RDA expression level.

In many ways, the recorded sound community shares the concerns over the work and expression concepts of the moving image community, especially with regard to variants such as arrangements, transcriptions, and excerpts. For example, in RDA and traditional cataloging practices, arrangements are considered different expressions, but it is arguable whether patrons perceive them in that manner or whether they see them as variant, derivative works. Currently classical music arrangements are often not distinguished by separate authority records. Often, people know the arrangement they are looking for, but searching for the arranger name will elicit no responses as the arranger names are not always noted on records. In Variations, arrangements could be treated as individual works, with links to the entities identified as arrangers, when known, and a relationship established with the original work entity. Another point of note is the fact that the use of these terms depends upon the performing conventions of

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[13] Online Audiovisual Catalogers Cataloging Policy Committee, "Moving Image Work-Level Records Task Force: Report and Recommendations – Part I and II", January 5, 2009, p. 5. Accessed 14 May 2014 from http://olacinc.org/drupal/capc_files/MIW_1-2.pdf

[14] Jenn Riley, Casey Mullin, Caitlin Hunter, "Automatically Batch Loading Metadata from MARC into a Work-Based Metadata Model for Music," *Cataloging & Classification Quarterly*, 47:6, 519-543

[15] The Variations model has been extended to include video content in the Avalon Media System (http://www.avalonmediasystem.org/) and the EVIA Digital Archives Project (http://www.eviada.org/). The efforts of commercial providers like Naxos and Alexander Street Press to create their own metadata models for audio and audiovisual content in their various products such as the Naxos Music Library, Naxos Spoken Word Library, Naxos Video Library, Naxos Classical Music Library, Smithsonian Global Sound, and various other subscription packages sold by these two companies and others, are also worth considering.

a particular broad genre of music. This issue is further explained in **Appendix A**, which discusses the concepts of performing conventions and culture in relation to three broad classes of music: Classical or Western art music, Western popular music, and traditional music and content. However, it should be noted here that Classical music performance is strictly controlled by rules whereas popular music is more flexible, with emphasis on the performer rather than the work's creator(s), and variation is the name of the game. The concept of "arrangement" is built-in and not highlighted. However, RDA requires all music to conform more closely to classical music, which favors principal responsibility for works and albums over performing artists, even when these conventions do not apply.

PBCore / EBU Core

From the broadcasting community, a simpler model is provided by PBCore and EBU Core, but one which gets to the heart of some of the requirements for describing audiovisual media. These two standards define two entities, which can be summarized as *content* (known as *asset* in PBCore and *object* in EBU Core) and *carrier* (*instantiation* in PBCore, *format* in EBU Core). Because audiovisual materials tend to be manifest in a wide variety of formats depending on their use (theatrical exhibition, television, published DVD, online) and generation (production master, preservation master, access copy), the distinction is important. One content item will be manifested in several carriers that, while containing identical or nearly identical content, are of different resolutions, formats, or packaged slightly differently (e.g. with/without credits, titles, bars and tone). PBCore and EBU Core do not differentiate between concepts like work and expression. The content can simply be anything that an organization needs to describe, which may or may not be captured in a carrier (e.g. description of a collection, such as a radio or television series). Significant changes to the content would result in a new content description, with a relationship to the original content, although subtle changes, such as a credit for a new funder in public television or radio, would not.

indecs

Another point of view is provided by <indecs> (indecs). indecs, is a metadata framework and "model of commerce," where commerce is, "used in the broadest sense, not necessarily having financial gain as its object," meaning it applies equally to cultural transactions such as those that take place in libraries. indecs can be applicable to what the authors term, "content or intellectual property."[16] The indecs content model is applicable to any resource type, not just audiovisual, and it provides a slightly different view of the relevant entities at roughly the equivalent level of the work and expression entities in FRBR, which are defined as *abstraction* and *expression*. However, because it attempts to model a more broad set of content than FRBR, the definitions of these entities differ, and to a large degree extend beyond those in FRBR.

In the indecs model, abstraction "is the entity often popularly called a work. However, in the indecs framework a work is a piece of intellectual property (ip) defined directly in terms of the

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[16] Godfrey Rust and Mark Bide, "The indecs metadata framework: Principles, model, and data dictionary," June 2000, p. 4. Accessed 13 May 2014 http://www.doi.org/topics/indecs/indecs_framework_2000.pdf

legal provisions of the Berne Convention, so while all works are abstractions, all abstractions are not necessarily works in the legal sense." They further note that, "Rights are one of the major drivers of functional granularity. For example, if a translation has different rights from the original work (which will almost certainly be the case), it must be identified as a distinct creation,"[17]and therefore a new abstraction.

In contrast to FRBR and RDA, expression in indecs is defined as an event, or broadly, a "performance" which is recorded, with the relationship to the abstraction being defined as follows: "An expression may give rise to an abstract work; at the same time it may be an expression of an existing abstract work."[18] indecs provides a useful explanation of the expression concept: "Separate rights frequently exist in expressions. Recorded audio and audiovisual performance are the most commonly identified expressions. Live performances are also creations that may require identification and description for rights purposes, even if the performance itself is not recorded in audio or audiovisual form. *Static* manifestations such as texts, paintings or photographs are the results of creatingEvents, but these events themselves (the act of writing or photographing, for example) are not generally treated as expressions (or intellectual property) in themselves."[19] Given these definitions, it is clear that indecs is an event-centric model, as opposed to the work-centric model of FRBR. As the examples below demonstrate, this approach is more aligned with the **needs of the largely event-based creation of audiovisual content.**

Manifestation / Item

FRBR / RDA

FRBR identifies a ***manifestation*** as, "the physical embodiment of an *expression* of a *work,*" and ***item*** as, "a single exemplar of a *manifestation*." This model more or less assumes that a manifestation is a publication issued in multiple copies for the consumer market. An item is what a cataloger actually has in hand and is representative of a specific manifestation of a single publication. New manifestations are identified as those that exhibit changes in form, are created at a different time, and/or where the production process involves a new entity (e.g. publisher, distributor). Attributes at the manifestation level within FRBR and RDA describe the production process and physical characteristics: publisher name/date, distributor name/date, carrier type, dimensions, extent, playback characteristics. Attributes at the item level are limited only to those that might be unique to a copy of a manifestation: identifiers, condition, access restrictions, marks/inscription, and exhibition history.

FIAF

The FIAF and EN 15907 models largely align with the FRBR/RDA definition of manifestation. FIAF defines manifestation as, "the embodiment of a moving image Work/Variant," and specifies

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[17] Rust and Bide, 28
[18] Rust and Bide, 27
[19] Rust and Bide, 28

that, "It possesses common characteristics with respect to shared intellectual content and physical format, e.g., releases, broadcasts, etc."[20] FIAF indicates that a new manifestation is identified by changes in production context and/or format, similar to the FRBR definition.

The item entity defined by FIAF also aligns closely to the FRBR and RDA definitions, with the primary distinction being the level of detail defined for the technical attributes of moving image materials, including physical attributes of film materials (base, gauge), and technical attributes of video (standard) and file-based materials (resolution, bit depth).

Variations

The closest parallel to the concept of manifestation within Variations is **container**, which represents the physical item or set of items on which one or more instantiations of works can be found (e.g. a CD). Variations defines **media object** similarly to a FRBR item. Variations' origins as a digital library project necessitated the description of the original recording object as well as derivative access files. The authors of Variations note some functional distinctions between FRBR and Variations' approaches, "most notably that the Variations model does not re-use Instantiations on multiple Containers, whereas according to FRBR the same performance issued multiple times would be modeled as one Expression appearing on multiple Manifestations."[21]

indecs

indecs also has a similar definition of manifestation, again with emphasis on the role intellectual property rights plays in distinguishing between entities: "A *manifestation* is a particular type of artefact in which *expressions* and/or *abstractions* are recognized which may have underlying intellectual property. Manifestations include the books, CDs, videocassettes, films, newspapers, software programs, digital objects and all the other forms of created stuff which manifest 'content'."[22] Items are individual instances of those manifestations, which inherit characteristics which would be shared across duplicate copies, but may also require local metadata specific to that item such as identifiers, location, and ownership.

PBCore / EBU Core

PBCore and EBU Core, applying the content and carrier model, enable the description of multiple instantiations of a given content item that are typically found in broadcast collections. This model allows organizations to effectively describe the functions of various instances: preservation, mezzanine, access, production, etc. These can be related to one another through relationship types (e,g. ebucore:isVersionOf), and their roles describe through generations (e.g. pbcore:instantiationGenerations). These standards harness the concept of **essence** as the thing that is captured on an instance, which is as much about the bitstream or signal as it is about the

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[20] FIAF, p. 47
[21] Riley, et al, p. 522
[22] Rust and Bide, p. 27

content carried in that stream. Essence is expressed in these models through sets of carrier sub-elements, such as pbcore:instantiationEssenceTrack, which can be repeated for different essence types found in that carrier. For example, a digital video file might have one video track, two audio tracks, and a subtitle track. Details for each would be expressed under individual instantiationEssenceTrack containers.

Events

There are several additional entities which are defined by these content standards, including agents (persons, families, and corporate bodies in FRBR/RDA), subjects, places, and events. While most of these have parallel interpretations across the models, *event* stands out as a concept that is interpreted in significantly different ways.

Events within FRBR/RDA are generally related to the subject matter of the work. As noted previously, RDA makes exceptions for certain types of events such as the performance of a musical work, but again, these are limited and do not support the full spectrum of event types defined by other frameworks described below. While this approach to event is important, it leaves out the ability to describe an event as the content itself. Take for example, the case of an audio recording of a battle that took place during World War II. In this scenario, the battle is simultaneously the event and the content. A cataloger would want to describe the content by the specific battle name, location, date, and likely the particular military groups that participated. The description of this resource could be considered *event-centric*, in that the action that occurred in space and time is the object of description at the content level, not a work in the mind of a creator. The subject description for the content may be the more general LCSH term "World War, 1939-1945," but in this case it may not be obvious that the subject heading indicates more what the content *is* rather than what it is about. By contrast, the description of a recent television program that is about World War II would also apply the same subject term. However, it may also be important, especially for an archive that has the original production elements of this program, to note that the re-enactment of the particular battle was filmed in Pennsylvania in 2014. The distinguishing characteristics of a filmed re-enactment versus resources recorded at the actual battle will require the location, date, and name of the event, plus controlled subject terms that will allow collocation, yet clearly distinguish the event re-enactment from the actual battle itself. Catalogers using RDA would find the description of this resource tremendously challenging.

By contrast, FIAF and EN 15907 use the concept of event to characterize, "occurrences in the life cycle of a moving image Item," which might include production, preservation, and acquisition. In this sense, the event entity defined by these moving image models functions more like the event entity defined by the preservation metadata standard PREMIS.[23]

As demonstrated above, indecs, as an event-centric model, places emphasis on the role that events play in the creation of a resource, and uses the expression entity solely to describe events. Events can be "creating" events (an event which results in the making of a creation),

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[23] http://www.loc.gov/standards/premis/

"using" events (events which results in the use of a resource), or "transforming" events (events which involve the use of one creation in the making of another). Events are defined by the time and place in which they occur, and may be of varying granularity (e.g. the recording of an album over the period of 3 months, or 3 different events representing 3 days of recording at 3 different recording studios).

Europeana Data Model (EDM) provides another example that allows an optional event-centric approach. Its data model primer indicates that, "Among the possible approaches for descriptive metadata, one can distinguish "*object-centric*" and "*event-centric*" approaches. EDM provides constructs that allow representing metadata to follow either approach." [24] In this document an example is provided that demonstrates the applicability of an event-centric approach to describe an 18th century Egyptian vase in terms of its excavation, deposition. However in other EDM reports, notably "Recommendations for the representation of hierarchical objects in Europeana," several examples can be seen where events are used to define performances.[25] These examples make clear that the EDM is flexible, both broadly speaking, and specifically in its interpretation of suitable types of events.

The allowance of an event-centric approach, when appropriate has also been embraced by contemporary web metadata frameworks including Dublin Core and Schema.org, which both define event properties as types of resources, in the sense of rdf:type. Dublin Core considers event to be a type of resource (an object of dc:type), and indicates that, "Metadata for an event provides descriptive information that is the basis for discovery of the purpose, location, duration, and responsible agents associated with an event. Examples include an exhibition, webcast, conference, workshop, open day, performance, battle, trial, wedding, tea party, conflagration."[26] Schema.org, an ontology for markup of web resources developed jointly by Bing, Google, Yahoo! and Yandex, identifies Event as a sub-class of Thing (the top-most class in the model), defined as, "An event happening at a certain time and location, such as a concert, lecture, or festival. Ticketing information may be added via the 'offers' property. Repeated events may be structured as separate Event objects."[27] Events in Schema.org are at an equivalent level to CreativeWorks.

Aggregates

Aggregates are a complex topic across the standards reviewed. The final report of the FRBR Working Group (WG) on Aggregates evaluates three types: "(1) aggregate collect of expressions, (2) aggregate resulting from augmentation, and (3) aggregate of parallel expressions."[28] These types of aggregates are limited to distinct individual resources, for

[24] Europeana, "Europeana Data Model Primer," ed. Antoine Issac, 14 July 2013, p. 12 Accessed 13 May 2014 from http://pro.europeana.eu:9580/documents/900548/770bdb58-c60e-4beb-a687-874639312ba5
[25] See for example page 23 and 28 in http://pro.europeana.eu/documents/468623/4a6eb2ec-4cc6-48b1-8824-92a1e564a279
[26] http://dublincore.org/documents/2012/06/14/dcmi-terms/?v=dcmitype#Event
[27] http://schema.org/Event
[28] International Federation of Library Associations, "Final Report of the Working Group on Aggregates," chair, Ed O'Neill, 12 September 2011, p. 3. Accessed 13 May 2014 from

example, a compilation CD or a book with chapters written by multiple authors (type 1), a book with supplementary material in addition to the expression of the work (type 2), or a website that can be viewed in multiple languages (type 3). Within this scope, the WG defines an aggregate entity as, "a manifestation embodying two or more distinct expressions."[29] They also note that because these aggregates themselves often represent a distinct intellectual effort, they may optionally also be considered works, specifically an aggregating work. The WG stresses that, as FRBR is not prescriptive, these modeling approaches are meant to be flexible, and allow degrees of description appropriate to the local descriptive practice and context. RDA adopts this approach, indicating that work, "can refer to an individual work, an aggregate work, or a component of a work," (Section 5.1.2). Likewise, a resource, which normally refers to a manifestation, may describe "an aggregate of entities," (Section 1.1.2).

The WG adds a note on the limitation of this recommendation, however. In **Appendix A**, the authors note, "We also recognize that aggregates could occur for any entity….some examples could be viewed as works of works (such as archival *fonds* or serials that contain articles that are works of various authors), and some works of works have their own collective title."[30]

Other standards vary in their modeling of aggregates. The FIAF model takes a similar approach to FRBR, indicating that a manifestation may be related to one or more works, such as in the case of compilations, and therefore the aggregates are modeled as manifestations. EBU Core and PBCore consider a "collection" a type of resource along the same lines as the Dublin Core approach for dc:type.

3   Requirements for Moving Image and Recorded Sound Content at the Library of Congress

As the world's largest audiovisual archive, with over 1.4 million moving image items and over 3.5 million sound recordings, the Motion Picture, Broadcasting, and Recorded Sound Division (MBRS) of the Library of Congress has arguably the most diverse collection of moving image and recorded sound content found anywhere. The division also holds many manuscript collections. MBRS staff process a diverse range of content and formats which have been acquired through copyright deposit, donation, transfer, or purchase. Collection materials are described in various systems, including MARC records in the main Library of Congress Catalog, records in MAVIS (the current collection management system), finding aids, and legacy databases. This means that staff members are required to learn multiple descriptive practices and data structures. The choice of which description method to use depends upon a number of factors, including whether the resource being described is published or not, the format, and whether the resource will be sent to the preservation queue in the near future. The latter issue is particularly significant and calls for the creation of MAVIS records, as the Packard Campus's digitization workflow software interacts with MAVIS and requires a MAVIS record to exist before orders can be created. As a result of this requirement, records created in other databases with

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http://www.ifla.org/files/assets/cataloguing/frbrrg/AggregatesFinalReport.pdf
[29] IFLA, p. 6
[30] FRBR Aggregates, p. 19

different data structures need to be converted to MAVIS on a fairly regular basis. Thus, there is not one system of record: resource descriptions may exist in MAVIS that are not in the Library Catalog, and vice versa.

This daily reality has provided the opportunity for staff to consider how metadata should be better modeled to accommodate content types, rather than focus on the needs of specific forms (e.g., music, feature films). Catalogers are forced to grapple with the descriptive needs of time-based recorded content ranging from narrative feature films to bird songs and everything in between. The MBRS and Moving Image and Recorded Sound Sections have given considerable thought to FRBR, RDA, and the other guidelines that have been discussed here and have identified goals for data modeling and resource description that incorporate aspects of the standards described above, but go beyond them. It is notable that the moving image and recorded sound sections have not adopted RDA for the description of content at this time, as it does not adequately fit their or their patrons' needs. Further details on where the RDA guidelines diverge from the requirements of moving image and recorded sound as identified by MBRS are provided below.

For the purposes of this study, the content of MBRS provides a useful test bed, and the requirements of this collection illustrate the diverse needs for resource description across the various audiovisual collecting communities at large. Having arguably confronted the processing and description of the most diverse set of audiovisual content in the world, the Library of Congress is in a unique position to understand descriptive requirements across content types, rather than focus on a specific type.

Moving Image Section

The MBRS Moving Image Section processes materials that range from paper prints of the earliest silent films, to entire collections of dance choreographers, television episodes (and increasingly webisodes) of reality programming, and live documentation of military action. Because much of this material does not fit the patterns for content types identified in the existing data models within the library community, difficulties arise in the description of content, and inversely, search.

For example, Moving Image Section staff point out that television episodes of news programming, reality television, and late night entertainment, lack formal titles. In these cases, the date of broadcast is often the most important identifier, along with the names of people who appear in these shows. Another significant example is the collection of recordings of the US Congress House and Senate floor proceedings, where the camera functions as a witness or data collection tool and the content is created for evidentiary purposes. Moving Image Section staff stress that these materials are arguably not *works* in the FRBR sense as they document a particular event as it is occurring in real time. In these cases, the date of the recording is of critical importance, as is the duration of the floor proceeding, identification of which Congress and congressional session, the names of people who appear in the recording (Senators and House Representatives), identification of the House or Senate recording studio responsible for

the creation of the video, the location of the action, and how the content is related to the Congressional Record.

Even for published works, which conceptually fit the RDA model, Moving Image Section staff have found RDA difficult to apply for the description of much of their holdings. The split that occurs between creators and contributors at the work and expression levels makes it challenging to decide what names and corporate bodies to transcribe in a statement of responsibility. Guidelines for preferred titles for motion picture and television works remain part of a separate LC-PCC Policy Statement appendix that requires revision and formal integration into RDA. For example, there are instructions for establishing preferred titles for television seasons as they are represented on a particular video manifestation to accommodate browse displays in the catalog. *Optional* foreign language and commentary tracks that are bonus features of DVD or Blu-ray manifestations of these are considered expression level attributes, even though their existence does not change the actual content. The choice of titles from preferred sources of information is unclear and inconsistently applied. Original dates of release or broadcast remain buried in a note due to an emphasis on recording the date of the publication of the video manifestation, even though it is important to users to identify a particular motion picture or television program by original date of release or broadcast. The concept of publication and distribution, which is differentiated in RDA, is difficult to delineate for motion pictures and television programs, which are typically distributed in multiple streams across multiple formats.

The moving image section has identified several goals for a suitable content model for the range of content found within their holdings, which should provide them with the ability to:

- Describe collections of material, including resources that are not publications/published material: preprint, production elements, lobby cards, trailers, sketches, manuscripts, movie scripts, oral histories on video, letters, transcripts
- Describe event-based content: Live sports, oral history, performances, Senate and House floor proceedings
- Express the concept of versions and relate those to original elements and works, e.g., Blade Runner: US Theatrical Release (1982), US Broadcast Version (1986), Directors Cut (1991), 10th Anniversary Edition (1992), The Final Cut (2007), which are all edits of the same original content
- Better accommodate the description of original broadcast versions of television series and episodes, that can co-exist and are delineated from the DVD or Blu-ray compilations typically collected by libraries
- Facilitate and manage researcher contributions to content they have little to no information on, e.g., a 16mm film in the collection labeled "America's Best City" – this is all they know about it, not who made it, when, why, or what the context was
- Include the identifier of the Entertainment Identifier Registry (EIDR) at the work level for content items found in that registry to better align with the motion picture and television broadcasting industries who submit their content as deposits through copyright registration

It is notable that these recommendations combine elements of many other models, but do not align perfectly with any one.

Recorded Sound Section

Like Moving Image, the Recorded Sound Section at the Library of Congress processes and catalogs a wide range of content types, ranging from music in various genres (classical, pop, jazz, traditional), to oral histories, ethnographic field recordings, radio material, and environmental sounds. Again, with this wide of a variety of materials, the challenges are many.

The biggest challenges for recorded sound cataloging become apparent when performing searches for sound content in the Library of Congress Catalog. For example, it is very difficult for a user to be able to easily and quickly find all instances in which a specific artist has performed a particular work. Searching in the Library of Congress catalog for the title "Top Hat" and name "Fred Astaire" produces 27 results. In order to determine in which of these Astaire actually performs that work, the user must look through each individual record. This is attributable to the lack of viable means to explicitly indicate a relationship between work and performer other than in notes. Search engines return results with records indicating in the notes that someone else is performing "Top Hat" while Fred Astaire actually performs a different work on the same resource. This issue is largely attributable to the cataloging choice made not to provide a direct relation between performer and what they performed, as is available in many search systems. This type of search challenge becomes more problematic when results are in the hundreds.

The goal of describing works at the track level does not currently fit into the existing cataloging model, which allows for the listing of tracks as contents. However, individual tracks often have different writers, performers, speakers, etc, and may have been recorded on different dates. Catalogers desire the ability to express tracks as individual content elements, with their aggregate represented through a manifestation.

Dates are another concern for recorded sound content. Many dates which might be of interest to patrons, including those associated with the music/text, recording dates, broadcast dates, and copyright dates, among others. It is desired to record multiple dates, and relate those with different entities: copyright dates associated with one, and performance dates associated with another. Identifying the date that users would likely be searching for when looking for a given content item varies greatly depending on the content type. This pattern applies to other types of data as well, such as geographical location, which may be the place something was published, the location of a recording, and the location of the associated content, all of which may be very different places.

The expression of events is also very important for the description of recorded sound content. The performance of a musical work can largely be considered an event, which takes place at a particular place and time. Similarly, a radio interview is an event, as is a press conference, a

soundscape recording of a city, and a field recording of traditional music or events.[31] The date, location, and type of event are at times the most critical attributes of a given content item, especially in those cases where there is no work at all.

The Recorded Sound Section has identified the following goals for a future data model to support the description of sound content:

- Provide a largely event-centric model, which allows for the inclusion of works, or some work elements as part of the event, but does not require a work be present. While not everything will necessarily be an event (for example, production audio), it is believed a basic event model should allow for flexibility where these descriptions are needed (similar to the indecs approach)
- Describe collections of content with a variety of published and unpublished recordings, as well as associated material, e.g. broadcast recordings, commercial recordings, letters, transcriptions
- Describe individual tracks on a container
- Describe granular features of certain formats to enable identification of the appropriate playback equipment, e.g. for a ¼" audio reel, number of tracks, playback speed, reel size, etc.
- Incorporate a structure for ethnographic/traditional content, incorporating elements of context and important data fields missing from most existing structures/content standards
- Make it clear that software systems which will support the data model should allow multiple entry options (text/string, linking/URI, and/or linking at a later date) for specific fields
- Be able to effectively ingest metadata submitted through copyright deposit with content coming from the recording industry, which is likely to be aligned with indecs (e.g. DDEX)

4   Toward a Generic Content Model

The creation of all collectable content, in any form—moving image, sound, text, image, etc.—generally involves the same approach: the capture, into a fixed form, of a set of ideas or something that occurs in real time. Not all aspects of the creative process apply to all forms. For instance, the capture of an event that occurs in time and space is generally limited to photographs, moving image, sound, and potentially certain types of text documents, such as transcripts or meeting minutes. These may or may not be the expression of an intellectual idea; they may simply represent the capture of some real time action. In other cases there may be both conceptual content as well as real-time action, such as a feature film or pop music song.

At times it is important to understand details around certain aspects of the capture and/or

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[31] It is important to note that ethnographers will often turn on the recorder and let it run. Titles (usually devised by the ethnographer) of published recordings of such content often just list the culture group and possibly the place and date rather than "song" titles. Note that ethnographic documentation can cover events that include music, spoken word, dance, game playing, and more.

content manipulation process itself (e.g., the actual fixing of the content to the medium); other times less so, depending on the user and their requirements. For example, the average public library likely does not want to describe the detailed process involved in writing, editing, and publishing a book as their patrons are not interested in this level of detail. In other cases, it may be necessary to describe these processes, such as in the case that a library holds the archival papers of a writer, which may contain *only* documents that reflect those processes: successive drafts of a book, galleys, etc., and also post-publication reviews, correspondence, and so forth. A television or radio archive that holds the original production elements, as well as the edit master, of a news magazine program will likely want to describe details about the production process itself: who was the cameraperson that shot the original footage of the press conference, who was the editor that brought those elements together, what was the station that produced the final program? These are questions that users of such collections will want to know, especially considering cases such as radio and television broadcasts, for which the producers are considered the primary creators of the program as a whole. The role of the interviewers and recordists are important to the original content creation, but not necessarily the completed broadcast.

The level of detail needed to describe characteristics of an instance of a given content item may also vary with context, the amount of time a cataloger has to devote to a single resource, or even with who is providing the description (e.g. a patron). A public library will likely not need to describe any more information on the physicality of a published book or DVD than to simply indicate the format. But a library that holds a unique, original recording on ¼-inch open-reel audiotape it is responsible for preserving over the long-term will want to describe much more detail about the instance itself: the format, the duration, the recording speed, copyright restrictions, perhaps even the equipment that originally made the carrier, and whether or not the content is accessible to users. Much of this information is beneficial to the advanced user, the preservationist and engineers who have to reformat the item, and to collectors or discographers who are trying to decide whether or not to travel to distant libraries and archives to access the item.

No matter what the content or the organizational context, **the option to capture any or all** of these aspects involved in the creation of the resource must be available to the cataloger and other humans or machines that may want to contribute descriptions and relationships over time. indecs describes this requirement as the principle of functional granularity, meaning: "It should be possible to identify an entity whenever it needs to be distinguished."[32] Rather than be forced to compromise descriptive detail by making it fit into a model that is not aligned with the content type, or use vocabularies built for a specific, unrelated purpose, the cataloger should be able to easily describe any given resource using a shared model. That model should be intuitive enough so a trained professional user is able to interpret it and easily make decisions about how to apply it to a given content type.

BIBFRAME has the opportunity to be such a model. While it will not be all things to all content, it has the potential to offer a logical but flexible data model, and a strong core set of vocabularies

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[32] Rust and Bide, 10

that are extensible as needed. Modeled in RDF, BIBFRAME provides organizations the opportunity to utilize other namespaces in order to add more extensive description required in specific contexts, such as technical, preservation, and rights metadata.

This section proposes a generic content model and applies that model specifically to moving image and recorded sound content (with comparisons to other content types as needed). As will be evident, the existing models evaluated in this report have all influenced this proposal. An attempt is made to harness the strengths of each of these in order to conceptualize a content-agnostic model suitable for library description. Following this discussion, recommendations on how the model can either be aligned with the current version of BIBFRAME, or alternately be used to inform changes to the next version, are provided.

The following discussion is divided into two sub-sections:

- **Content Creation Domain Model**: A domain map applicable to the creation of any resource is provided. This simplified approach is used to illustrate the creation process, which will inform the second sub-section. It is not intended to represent the content model as such, but rather inform its development.

- **Content Description Data Model**: This model interprets the domain map in order to propose a generic data model for resource description. It extends the creation model to include entities required for the organization and description of content within collecting institutions.

Content Creation Domain Model
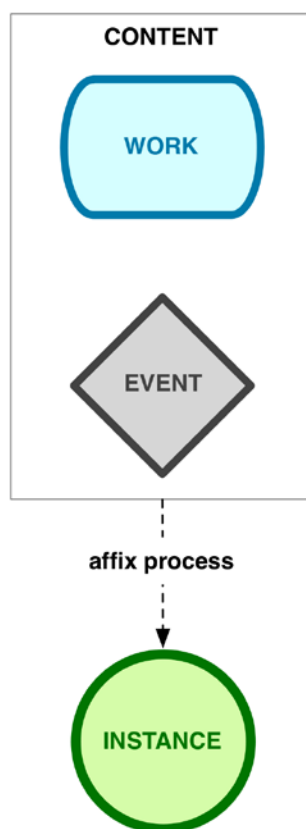
The diagram above illustrates several concepts consistent in the creation of resources and their relation to one another. These concepts can be interpreted as follows:

- **Content**: All content is either a distinct intellectual creation (a **work**), and/or the documentation of **event**[33] that occurred in time and space. That event may have taken place specifically for the purpose of realizing the work (a film scene), as a type of realization of a work (an opera performance), or it may have been independent of any intention to document that event (a bird singing). Content is often but not always fixed to a material form (e.g., a performance art work).

- **Affix process:** The creation of an instance of content necessitates the process of fixing a representation of the content to that instance. This process could take place using a camera (event capture), writing apparatus (work creation or event documentation), a sensor (data), or other tool. This action is performed by either human or machine, and is inextricably bound to an instance. It is represented as a conceptual relationship between the content and the instance.

[33] Although out of scope for this discussion, further investigation into the inclusion of non-content events (e.g. lifecycle events or preservation actions conducted on an object) in such a model should be conducted. This model is strictly limited to resource creation.

- **Instance**: An instance, or the embodiment of the intellectual entity, exists in some physical or digital form, and therefore exhibits some characteristics specific to that form. The instance may contain one (a novel) or more intellectual entities (a videotape with documentation of several events).

The relevancy of any of these aspects of content creation for resource description varies greatly. For many content types, especially published books, the question of who "fixed" the content is implicit through the author. Typically, an institution does not need to know what computer the author used, over what time period the book was written or edited, how many hours she worked each day, etc.[34] Similarly, for a feature film released on DVD, users are not interested in this level of detail; knowing the director and a few other key creators is sufficient. However, for a film archive that holds the original production elements of that film, or for the audio archive that holds master studio recordings of a commercial album, including all takes of each song, the option to describe these details is particularly appealing, as it is something users interested in these types of resources would be very eager to know.

Content Description Data Model

The content creation model provided above can be interpreted and aligned to a content description model for the purposes of resource description, as follows:

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[34] However, uses for this type of information are emerging in digital humanities scholarship.
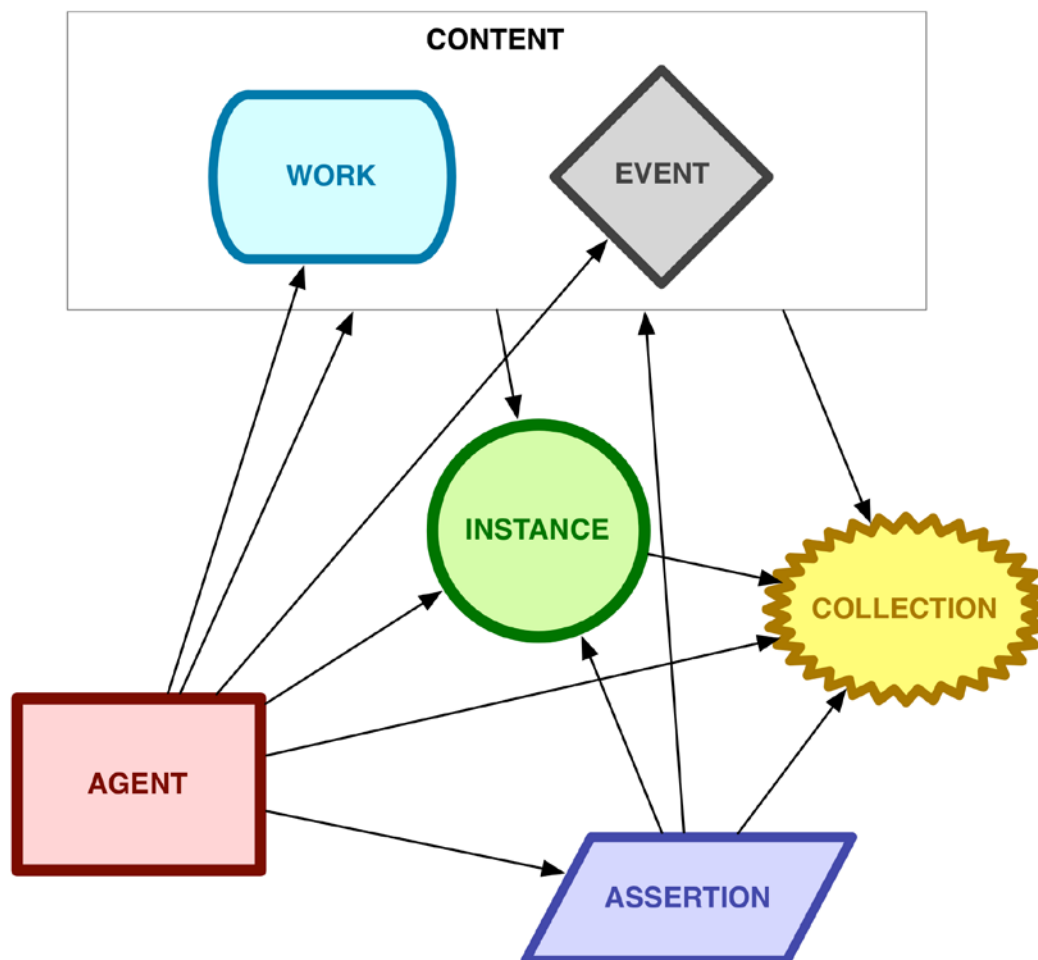
Several differences are notable:

- The **affix process** is represented here by an agent, as well as optional instance attributes (not in diagram). As the assumptions provided above indicate, description of the mechanism used to affix the content to the instance (camera, pencil, etc.) can be described as part of the instance as needed by the cataloger.

- In addition to their participation in the creation, the roles of various **agents** are important to identify in relation to the content and the instance, as well as additional concepts including assertion and collection, as described below.

- A **collection** class has been added as a way to describe aggregates of either instances (e.g. an archival collection) or content (e.g. the episodes in a radio series). In reality, there are multiple types of collections found in collecting institutions. Some collections are inextricably bound units with a provenance and *fonds,* as in the case of archival collections or corporate records, or are created under the auspices something broader, such as with the radio series. Sometimes, collections are organizing principles that have

meaning locally to the stewarding institution and its users, which could change in a different context. For example, a set of radio broadcasts may be organized as a collection under their respective series in an internal database, but in an educational platform aimed at primary school teachers, by grade level, school subject, or topic. It is therefore up to the collecting institution to assert collections as needed.

- An **assertion** is made by an agent about a content item, an instance, or a collection. Assertions are context-bound and are not inherent to the resource about which they are made. Assertions might include reviews of works, holdings of copies of instances in libraries, or comments on the condition or availability of a particular instance held. Catalog descriptions themselves can be seen as a type of assertion.

Rules governing the appropriate relationships for agents depend on the resource type. A book (work) will typically have an author related to the work, and a publisher related to the instance. An oral history (event) may have an interviewer and interviewee associated with the event, and the cameraperson and/or sound recordist associated with the instance (possibly even just one track on an instance). The determination of whether an agent should relate to the content or the instance should be defined by various communities of practice, but should consider whether the agent and their role would inherit in cases where the work is reformatted or manifests in another instance type.

It should be stressed in this model that event place and date are distinct from the concept of these same entities being associated with the content as *subjects*. For example, a library in North Carolina may hold video recordings of a conference on the subject of genocide. Different speakers at the event would have spoken about various historical atrocities in different locations: Rwanda, Armenia, etc. These places would be considered subject terms, and described as such in catalog records for the recordings. However, the conference location, Raleigh, North Carolina, would be the event place. Similarly, there is also the place associated with a performance style, regardless of performance location. A Cape Breton fiddler can perform anywhere in the world, but the performance style remains that of Cape Breton.

The event concept may be extended for collection management use cases to include lifecycle events related to instances, adhering with the FIAF and PREMIS event model.

Examples

The following examples are intended to illustrate the generic model proposed above, specifically for audiovisual resources. A book example is provided to begin as an illustration of the applicability of the model to other resources. It should be noted that no assertions are included in these examples, as they are meant to illustrate the more complex relationships between content, work, event, instance, agent, and collection.

Example 1: A book

This example illustrates well the current BIBFRAME model and its application to traditional library content.
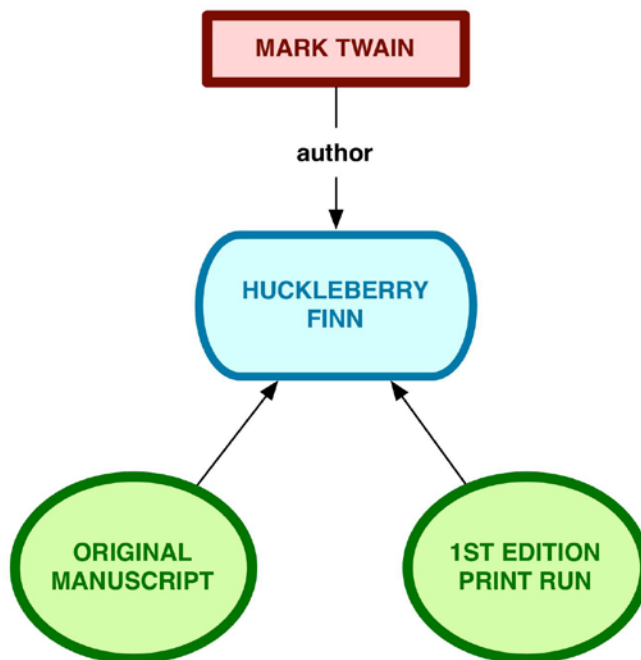

Generic content model applied to a book

This example is provided to illustrate conceptually how the proposed generic content model applies to other content types, in this case, a book. Here there are two instances, the original manuscript and the 1st edition. These and any other instances would be related to the work. Any translations or other versions of the primary work could be considered related works, variants, or versions of the original.

*Example 2: Field recording of bird songs*
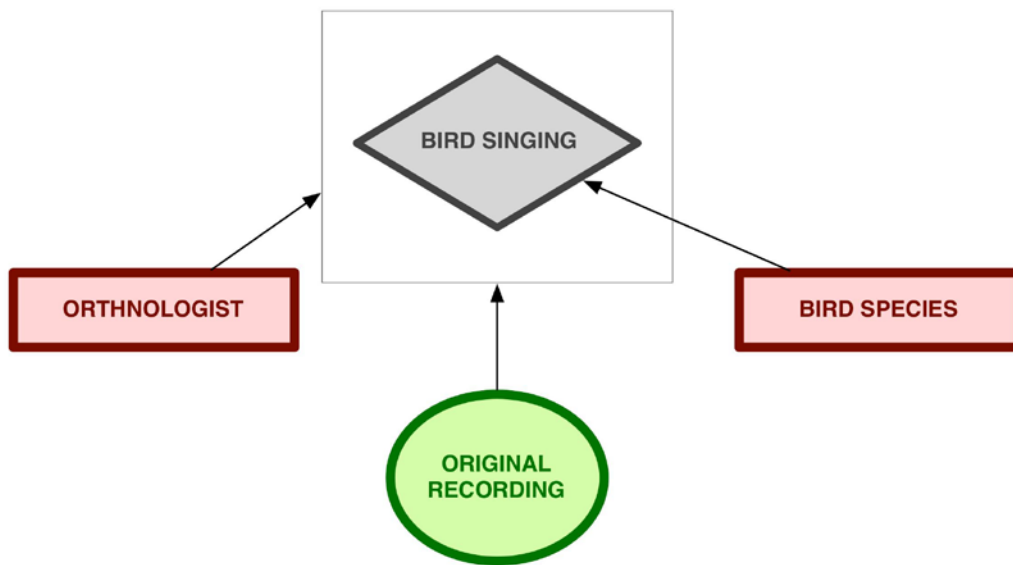
Field recording of a bird song

A library has an impressive special collection of bird songs, which is frequently used by researchers, teachers, students enthusiasts alike all over the world. For each recording, the library creates a catalog number, which is added at the beginning of the recording as an aural identifier, as well as in the catalog record. Key attributes of the recording are: what species is the animal, who made the recording, on what date, in what specific location, and on what specific device.[35] The content represented on the instance is simply the event of the bird call; there is no work in this case, rather it is strictly documentation of a naturally occurring wildlife event.

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[35] See for example, the records in the catalog at the Cornell Lab of Orthnology Macauly Library, such as the one found at: http://macaulaylibrary.org/audio/127299. Note that Cornell adds additional attributes including, habitats, age and sex of the bird, solicitation, etc. Were this to be content expressed using BIBFRAME, these attributes could be included by extending to other namespaces, such as the BBC Wildlife Ontology, or others as appropriate.

Example 3: Original recording of the Rodney King beating
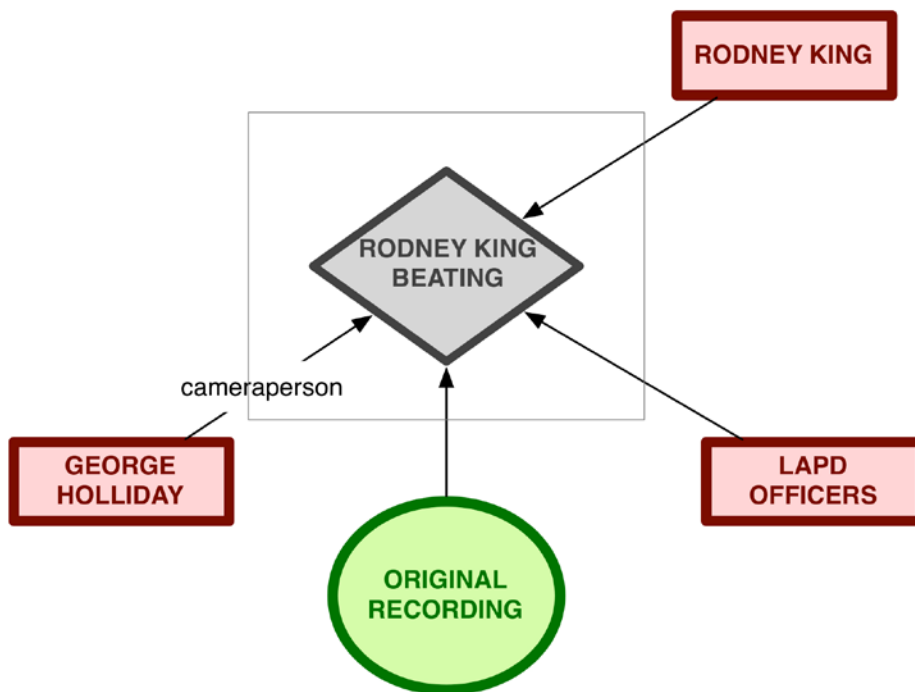
In this example, a library has acquired the collection of local television station KTLA in Los Angeles that has the original recording of the Rodney King beating. The content of the video, the beating of driver Rodney King by LAPD officers on March 3, 1991, was captured by a bystander, George Holliday, who began recording the incident as he witnessed it from the balcony of his apartment. The content of the recording is considered evidentiary, and was widely used in news media as well as criminal proceedings following the incident. There is clearly no work, as the event occurred outside of any intention of it being captured, and the documentation of the event was made for purely evidentiary purposes. In general, home movies and video function more as a mode of documentation, recording events and milestones such as birthday parties, holidays, parades, etc. However, at times home movies and video can have more creative intent, and be considered works, such as *Disneyland Dream* (1956), an amateur work added to the National Film Registry in 2008.

Example 4: Live performance of Beethoven's 5th Symphony
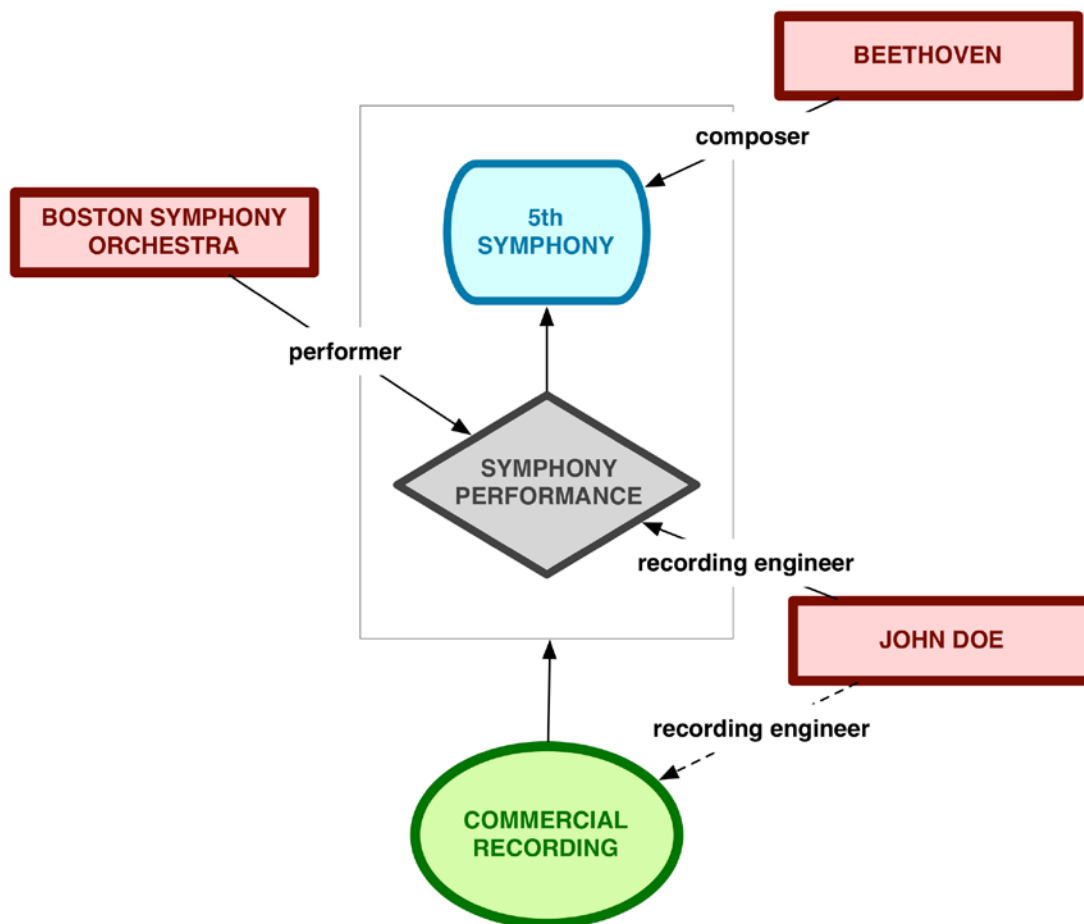
Commercial release of a performance of Beethoven's 5th Sympony

A library has a commercial recording of Beethoven's 5th Symphony (work) as performed by the Boston Symphony Orchestra live on April 3, 1996 at Carnegie Hall (event). Beethoven and the orchestra are agents related to the work and the event respectively. Likewise, the recording engineer who was responsible for the recording for the purposes of the commercial release of this performance is related to the event, and optionally the instance. Other agents could be associated with the event, including conductor, soloists, etc., as needed. It should be noted that this example has been dramatically simplified. For a detailed discussion on the complexities of describing Classical music, see **Appendix C**.

Example 5: Original field recording of an expressive traditional of a community in Indonesia
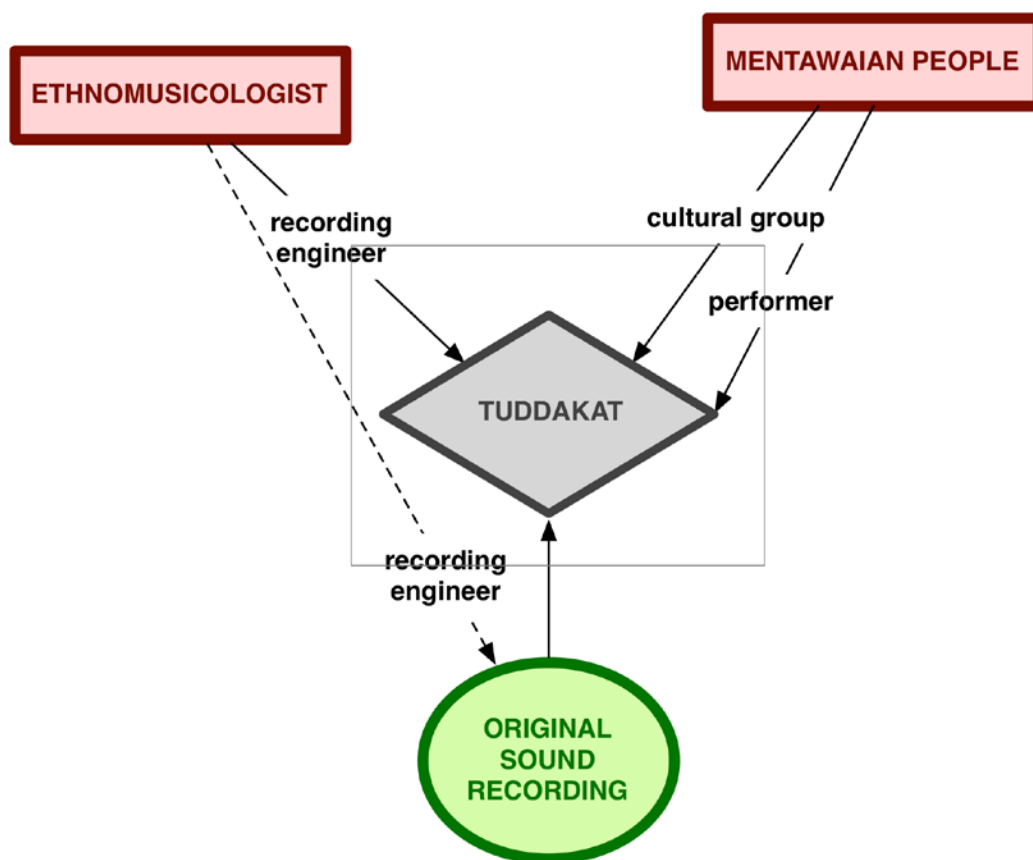

Field recording of a traditional cultural expression

A library has the original digital recordings made by an ethnomusicology faculty member during a trip to Indonesia. This diagram illustrates one of the tracks recorded, a traditional expression labeled by the recordist as "Tuddukat." In this culture, the "tuddukat" is a slit drum, which on this occasion, was performed to comment upon a successful deer hunt. In the model above, "Tuddukat" is presented as an event associated with the traditional heritage of the Mentawaian people. The issue of whether the provided information represents work or event information might be up for debate and is highly dependent on the cataloger's knowledge and interpretation of the cultural traditions of the Mentawaian (see the last section of **Appendix A** for a detailed discussion on cataloging issues related to traditional content). Like other forms of intangible heritage it is associated with a group of people, and manifests in specific contexts, therefore the Mentawaian people are related to the "event" with the role of "cultural group," as it is critical to know that member(s) of the Mentawaian culture were performing in this instance. It could also be possible to indicate through context fields that an event is associated with a particular culture as well, which is particularly helpful when members of one culture perform or realize content

that originated with a different cultural entity. The occasion on which this particular recording was made is expressed as an event, with a date, location, and agents associated, in this case, the ethnomusicologist who captured the recording as well as the Mentawaian people performing. It is also notable that the ethnomusicologist has a relationship to the content as well as (optionally) the instance. The relation to the content is important because he plays an important part of the overall resource creation and that role must be inherited in future instances on which this recording is contained (e.g., a compilation CD of all the recordings). But it is equally important to understand his technical role in the instance creation.

The products of this ethnomusicologist's research might go beyond recordings to include photographs, videos, notes, etc., all of which might include information which further flesh out the experience of this particular event.
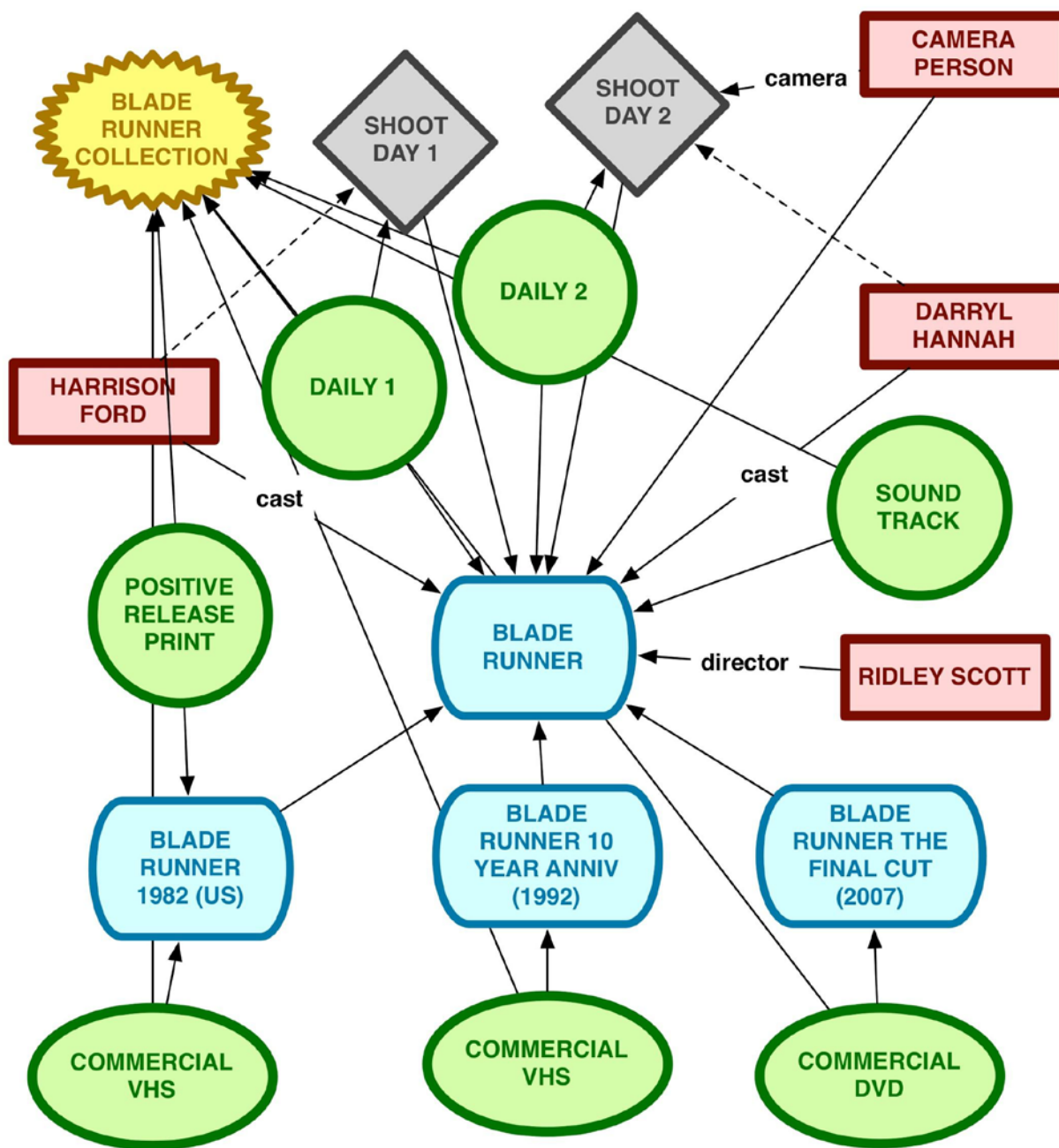
Example 6a: Commercial release of two versions of Blade Runner
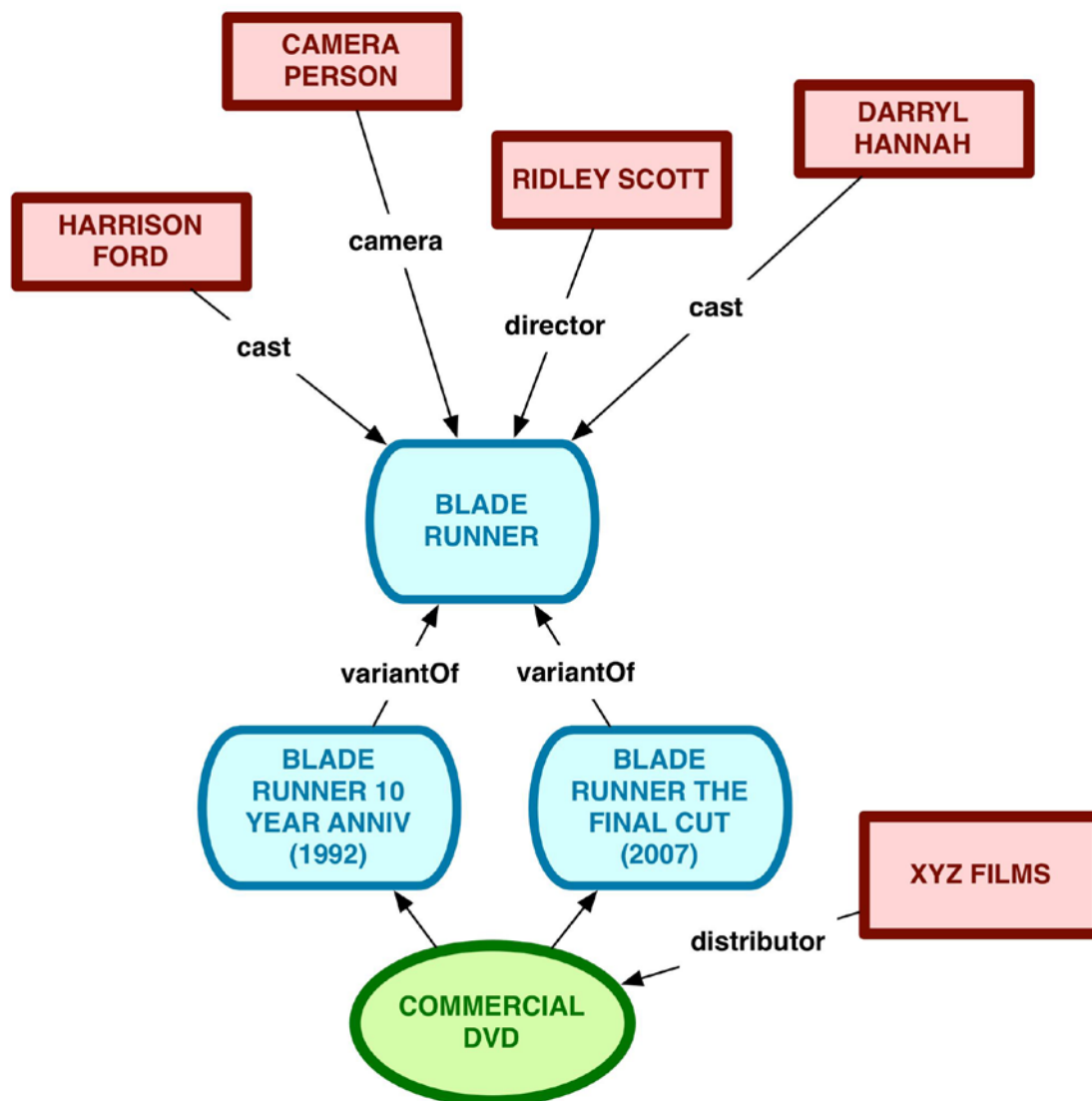
Commercial DVD release of two versions of Blade Runner

In this example, a Library has a commercial DVD that contains two of the versions of *Blade Runner* that have been released over the years. Each version is considered a variant of the original *Blade Runner*. The versions inherit many of the same attributes of the original work, but have new titles and dates. The commercial DVD is considered a single instance of these two works, and has a related distributor agent. There is no event in this example because the complex creation process is not apparent to the library that holds this DVD, nor is it a requirement of the library's patrons.

*Example 6b: Production elements for* Blade Runner *and commercial releases of various versions in a collection*

Original elements of the film *Blade Runner* **with commercial releases for various versions (unclear which elements were used in which release)**

This example provides an illustration of the model in cases where original production elements of a film are held, along with commercial releases, in a collection. In this example, the library holds many of the original elements of *Blade Runner*, including dailies, or camera originals from

specific shoots. These are considered events that have particular dates and locations associated. Cast members may be optionally related to the events if the cataloger is able to detail the individuals that appear on each camera original reel. When known, other contributors, such as the cameraperson for the specific day, may also be recorded. This level of detail fits the needs of researchers using the collection as well as helps meet the library's collection management goals.

Example 7: Television news production
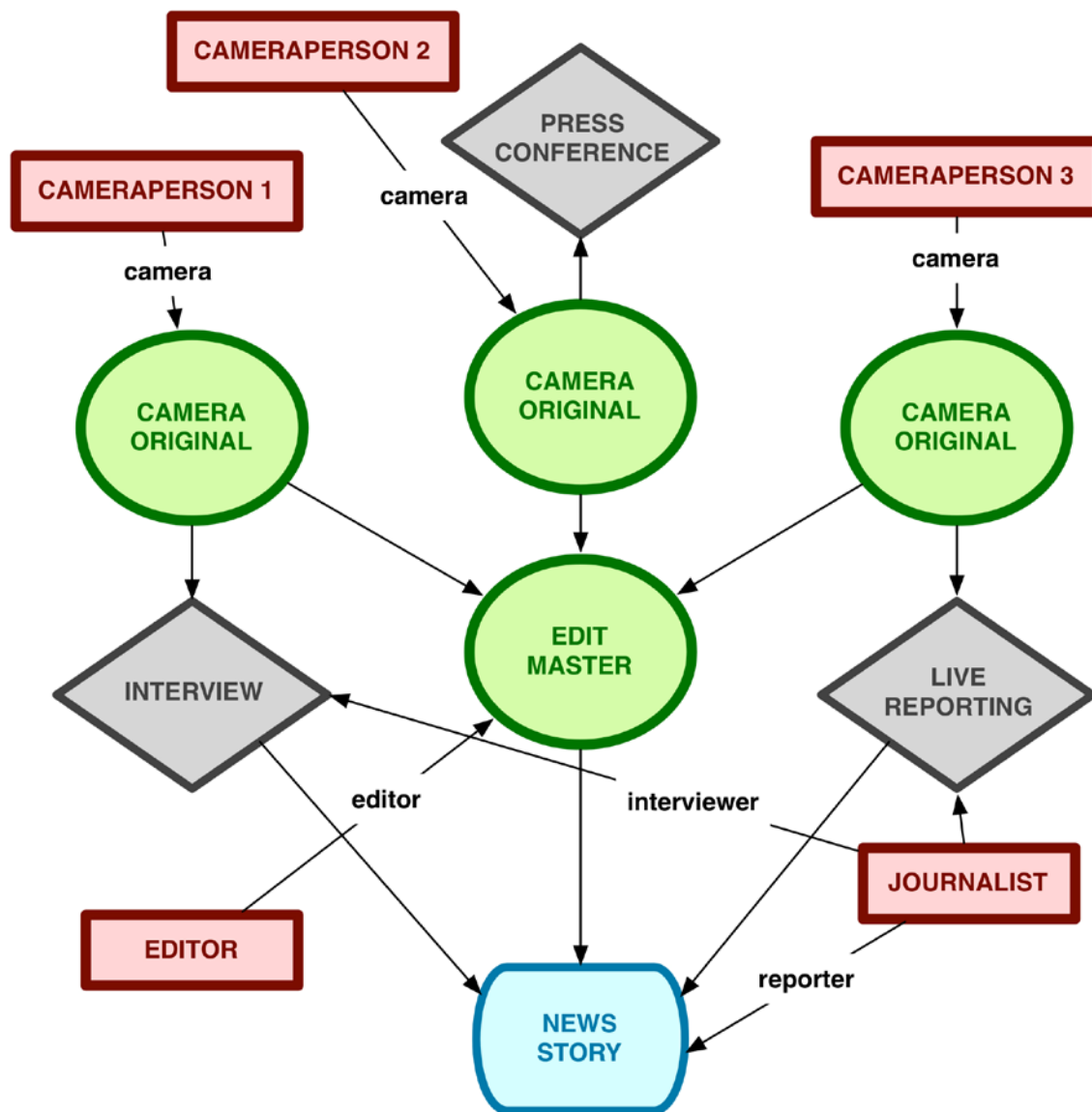
A news story composed of several segments, some of which were recorded specifically for that story, and others which occurred independently of it.

This scenario is typical of the holdings of a television production archive (and could equally apply to radio), many of which are found within research libraries. Footage of several separate events are combined to create the final product, which may or may not be considered works in and of themselves. Footage of the press conference, for instance, is not considered a work because the event took place independently of any intention of this station to create a news story about it. Another notable aspect in this example is the journalist, who plays multiple roles in relation to the events and the final work. The three camerapersons related to the three

different camera originals are also important in this context, as it can be important to identify who shot the footage for various research, preservation, and future editing scenarios.

An additional discussion on the complexities of the description of television content can be found in **Appendix C**.

5   Alignment with BIBFRAME

In many ways, the current version of the BIBFRAME model aligns well with the generic content model proposed here. Work, instance, agent and event are all existing classes. Assertions are equivalent to bf:Annotation, which are meant to specify individual holdings, cover art, reviews, and more. In fact, in many ways the BIBFRAME model removes the debates raised by the various content standards interpretation of FRBR by collapsing work and expression into the work class, and manifestation and item into the instance class (with some item attributes in the annotation class). There are multiple approaches for expressing roles, either as a property from BIBFRAME (bf:creator, bf:contributor) or other ontologies, or as a string using the properties of the bf:Relator class, as detailed in the BIBFRAME Authorities Draft Specification.[36]

However, BIBFRAME maintains the problematic "work" concept as the highest level entity that can be used to describe content. As argued throughout this report, the concept of a "work" has a very specific meaning within the library community and beyond. The boundaries of a work are somewhat fluid, however looking at it through the lens of intellectual property rights helps define these boundaries. For example, an event, such as a protest march, cannot be copyrighted, though documentation of it could fixed to an instance by a journalist, and that specific resource may be subject to copyright. On the other hand, *Avatar* is clearly a work, with various associated rights. Thus, when something is not a work, it does not make sense to call it such, especially in a model that purposefully disambiguates content from carrier. As demonstrated in the examples above, there are cases in which there is no work at all, such as the bird song, where the content is simply documentation, or cases where the event could incorporate and relate to a work, such as the performance of Beethoven's 5th Symphony. In order for this concept to be supported in the data model, a super class for bf:Content is required. The purpose of this class is largely to modify domain restrictions on existing and new BIBFRAME properties so they can be shared by both bf:Work and bf:Event as applicable, but also to allow uses of bf:Content as needed.

In addition to these requirements for high-level classes, there are many additional properties needed in the BIBFRAME model to support the identified needs of moving image and recorded sound content. Summaries of several of the recommendations are provided below. These recommendations are intended to be a starting point for further discussion.

It is anticipated that the proposed changes will not only improve support for description and access of audiovisual content, but will also benefit additional communities, such as scientific and research data, archives, photography, and more.

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[36] BIBFRAME 28 April 2014 version. Accessed 8 May 2014 from
http://www.loc.gov/bibframe/docs/bibframe-authorities.html

Recommendations for BIBFRAME

- Position BIBFRAME to not be exclusively work-centric, but optionally event-centric, or straddle the line between the two as needed. The current model assumes that all library objects are "works," when this is arguably not the case for a large sub-set of material, including audiovisual.

- **Create a super-class for bf:Content**. In this revised model, bf:Work and bf:Event would each be sub-classes of bf:Content. This flexibility would allow for expressions of Content description that are works, both events and works, or simply just events. Events could optionally be used along with works to express the fact that the work documented some action and took place in time and space. In cases where there is no work present (e.g. a bird song), only bf:Event would be used, and there would be no bf:Work. Finally, as in the case of most non-audiovisual resources, there will be cases when bf:Event is not used at all, and the only bf:Content type will be bf:Work, which, by the nature of being a sub-class of bf:Content, will inherit from its super-class.

- **Make clear that several types can be designated for a bf:Work and bf:Instance** As they are currently modeled, the instance types could be challenging to use with moving image and recorded sound content, as audiovisual instances may be archival, a collection, electronic, a monograph, a multipart monograph, or a serial or many of these at once. Choosing just one among these would be highly problematic for the cataloger and when translating from existing data sets. But a resource may be of several types and all may be specified. It is noted that the resource types that are specified for a description will enable creative use of profiles for assisting with the input systems for resources that have special characteristics, such as moving image (e.g,. need for bf:frameRate), and audio (e.g., need for bf:samplingRate).

- **Modify domain restrictions on some properties, and add additional domains for others**. There are several properties already available in BIBFRAME that support the needs of moving image and recorded sound works or events, but these are restricted to the Instance domain. These include bf:duration, bf:soundContent, bf:colorContent, and bf:aspectRatio. By allowing these properties to be used with bf:Content, catalogers can describe the original intention/characteristics of the content, even if that is quite different from the characteristics of an instance in the collection.

- **Consider adopting technical attributes for moving image and recorded sound instances**. As has been detailed in this report, access and preservation of audiovisual content are closely intertwined; patrons and collection managers equally require information on the technical characteristics of these resources. BIBFRAME already has some attributes needed to define the technical characteristics of audiovisual instances, such as bf:duration and bf:aspectRatio. However, to express the complete picture of an instance's technical make-up, additional attributes are needed. It is recommended that these be included in the BIBFRAME namespace as opposed to being extended by

external namespaces, and/or reviewed in the context of PREMIS. It is not recommended that BIBFRAME recommend usage of other namespaces for expression of technical attributes of audiovisual resources, as some of those that would be applicable are under unstable governance (e.g. PBCore has historically had no stable, consistent home).

- **Annotation should be extended to include some of the FRBR/RDA item attributes.** bf:Annotation already supports several of these, but some additional attributes could be included that provide information such as condition, markings/inscription, and brand of the item (e.g. Sony, Panasonic) which is often important in the case of magnetic tape and is considered a concept different than that of publisher/record label.

- **Consider adding date and dateType properties.** As described above, dates are complex for audiovisual resources. Recorded sound and moving image materials often have dates associated with the original release or broadcast, copyright, performance, composition, instance creation, etc. Instead of adding unique properties for each type of date, it may be more efficient to have date and correlated date types. A bf:keyDate with a type may be used to express dates that should be considered key for searching.

- **Investigate ways of enabling sequences.** Sequences of multiple content elements on an individual instance often need to be understood by their sequence. Audio recordings often consist of multiple individual tracks (works or other content items), which are related to one another by a sequence. Similarly, shorts, commercials, filmed sequences or excerpts on a compilation reel may have a particular sequence. Expressing the relationships between these content items on the instance should be supported. There is also the desire to sequence chapters on DVD/Blu-ray publications, tracks on published CDs and bands on published LPs. Europeana Data Model has a property edm:isNextInSequence, which may partially fulfill this requirement.[37] Structural metadata standards such as METS may also have a role to play. These approaches should be further reviewed in the context of BIBFRAME and the requirements of the audiovisual community. As this also may have an impact on other resources than audiovisual, it should be the focus of a broader study.

- **Investigate support for including time-stamps in descriptions of audiovisual content.** Because of their time-based nature, the content of moving image and recorded sound resources can often be best understood at specific time intervals. Similar to the sequence question (above), an approach for relating content to time segments on an instance should also be explored.

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[37] See for an explanation of the recommended usage of this property: Alessia Bardi, et al, "Recommendations for the representation of hierarchical objects in Europeana." Europeana, Accessed 14 May 14, 2014 from http://pro.europeana.eu/documents/468623/4a6eb2ec-4cc6-48b1-8824-92a1e564a279

Appendix A: Recorded Sound Issues Related to Music Types

Link to appendix A >>

Appendix B: Data Models for Discographies

Link to appendix B >>

Appendix C: Challenges with Complex, Multi-Part Audiovisual Works

Link to appendix C >>

Available as a separate documents

Resources

Bardi, Alessia et al, "Recommendations for the representation of hierarchical objects in
    Europeana." Europeana, Accessed 14 May 14, 2014 from
    http://pro.europeana.eu/documents/468623/4a6eb2ec-4cc6-48b1-8824-92a1e564a279

BIBFRAME, 28 April 2014 version. Accessed 14 May 2014 from
    http://www.loc.gov/bibframe/docs/bibframe-authorities.html

Council on Library and Information Resources and the Library of Congress. *The Library of
    Congress National Recording Preservation Plan.* December 2012,The National
    Recording Preservation Board. Accessed 15 May 2014 from
    http://www.loc.gov/rr/record/nrpb/PLAN%20pdf.pdf

EBU Core Version 1.5. Accessed 15 May 2014 from
    https://tech.ebu.ch/docs/tech/tech3293v1_5.pdf

UC Santa Barbara Libraries, *Discography of American Historical Recordings*, Regents of the
    University of California. Accessed 23 July 2014 from http://adp.library.ucsb.edu/

Europeana, "Europeana Data Model Primer," ed. Antoine Issac, 14 July 2013. Accessed 15 May
    2014 from http://pro.europeana.eu:9580/documents/900548/770bdb58-c60e-4beb-a687-
    874639312ba5

International Federation of Film Archives, "FIAF Moving Image Cataloguing Manual," draft
    version 1.5.1, March 2014.

International Federation of Library Associations, "Final Report of the Working Group on
    Aggregates," chair, Ed O'Neill, 12 September 2011. Accessed 15 May 2014 from
    http://www.ifla.org/files/assets/cataloguing/frbrrg/AggregatesFinalReport.pdf

International Federation of Library Associations Study Group on the Functional Requirements
    for Bibliographic Records, "Functional Requirements for Bibliographic Records: Final
    Report" International Federation of Library Associations and Institutions, February 2009.
    Accessed 15 May 2014 from
    http://www.ifla.org/files/assets/cataloguing/frbr/frbr_2008.pdf

Online Audiovisual Catalogers Cataloging Policy Committee, "Moving Image Work-Level
    Records Task Force: Report and Recommendations – Part I and II", January 5, 2009.
    Accessed 15 May 2014 from http://olacinc.org/drupal/capc_files/MIW_1-2.pdf

PBCore Version 2.0. Accessed 15 May 2014 from http://pbcore.org/

Resource Description and Access (RDA) Tookit. Accessed 15 May 2014 from
http://access.rdatoolkit.org/

Riley, Jenn, Casey Mullin, Caitlin Hunter, "Automatically Batch Loading Metadata from MARC into a Work-Based Metadata Model for Music," *Cataloging & Classification Quarterly*, 47:6, 519-543

Rust, Godfrey and Mark Bide, "The indecs metadata framework: Principles, model, and data dictionary," June 2000. Accessed 15 May 2014
http://www.doi.org/topics/indecs/indecs_framework_2000.pdf