Music information retrieval and FRBR

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LIS 653-3, Final Paper
April 23, 2013
INTRODUCTION

Music information resources come in an increasing variety of formats, and can take on a variety of forms derived from the same work. This can make the cataloging of musical resources very complex. In this paper I will review several articles focusing on how to catalog musical resources in a way that makes sense to the user when resources are retrieved and displayed.

There is much discussion in the literature about what constitutes a musical “work.” This discussion enters the philosophical and musicological realm in attempting to define a musical work. For librarians and catalogers, the importance of this discussion comes to bear on the creation of bibliographic records. In the days of the card catalog, focus was placed on the “main entry,” with the document as the focus and access point. With electronic catalogs, focus is better placed on the work, instances of that work, and relationships between those instances.

Key to this discussion is FRBR, the Functional Requirements for Bibliographic Records, developed by the International Federation of Library Associations (IFLA) in 1998. FRBR has the potential to greatly improve bibliographic access and discovery when applied to electronic catalogs, particularly in the music domain where instances of the same work may appear in varying formats.

FRBR shows great promise and potential, but has yet to have been applied in many real-world settings. The Variations project at Indiana University, which seeks to create a digital library with FRBRized bibliography records for retrieval and display, is one project where FRBR has been successfully implemented in a production setting. The team at Indiana has published several articles on the details of their project in hopes to enlighten future projects as to the benefits and challenges of applying FRBR.

THE MUSICAL WORK

Thomas and Smiraglia (1998) present a compelling discussion of what defines a musical work, and why it is important in the context of the OPAC. Libraries in the modern era of the 19th and 20th centuries have tended to focus on the printed score as the ultimate representation of a work, and thus the printed document had primary focus in the catalog. With the addition in the 20th century of music in formats other than the score, such as audio recordings and later videos, these audiovisual resources have primarily been classified separately mostly due to their physical, non-book format.

In the era of the OPAC, it has become necessary to re-evaluate the foundational principles of creating bibliographic records for musical resources. At the center of this is the defining of what constitutes a work, and relationships between different instantiations of a given work. Ultimately, music is a sonic experience, and so one could say that a performance is thereby the...
truest representation of a work, and a performance can then be represented in a recording. Prior to recordings, complete dependence was placed on the printed score and the semantic notations therein as the representation of a work.

Thomas and Smiraglia (1998) present several opinions from past literature as to the definition of a musical work. Dahlhaus pointed out that each performance can be a unique interpretation, and that a musical work can not only be reinterpreted by performers, but is also a conception in the mind of each listener. In a sense, there can be as many versions of a work as there are listeners, since each individual perceives music based on their own personal and cultural experience. Smiraglia portrays the work as the intellectual content represented in a bibliographic entity. Each entity possesses two properties: the ideas expressed and the symbolic (notational) expression of those ideas. The work is not confined to a single urtext document, or to the uniform title assigned to it. Scores, performances, and videos are all instantiations of the same work.

Smiraglia (2002) speaks of the instantiations of a work as bibliographic families, with common ideational and semantic content. He compares a score and a recording, for example, to members of the same family with a common surname. Thomas and Smiraglia (1998) refer to the taxonomy of relationships defined by Barbara Tillett. From there they expand on the category labeled derivative relationships. Various forms of a musical work can be derived from a single parent work, such as arrangements, piano reductions, or new recorded performances. They refer to these as “ideational nodes,” unique instances of the same work, and members of the same bibliographic family. Videos are unique ideational nodes in that they add another dimension to the information resource by the producers of the video content.

Thomas and Smiraglia (1998) argue that cataloging musical resources should be focused around the work (the intellectual conception), and not the item (the score). Different instantiations of the same work should receive equal treatment in the catalog, but the relationships between the instantiations and the work itself must be defined.

It is interesting to note here that this article from Thomas and Smiraglia appears in 1998 – the same year that the IFLA released its FRBR document. Smiraglia does appear to be thinking along the same lines as FRBR (and was likely aware of the discussions around it). Although he does use some common terminology such as work and item, he also avoids terms such as manifestation, for fear that may be confused with versions.

In Smiraglia (2002), he revisits some of the ideas from Thomas and Smiraglia (1998), and expands upon his philosophy of the musical work. He presents the idea of Music Information Retrieval (MIR) as a field of study, and a process defined as facilitating the automated retrieval of musical resources. Musical collections are unique in that they may contain multiple
instantiations of each work in a variety of formats. The key to information retrieval is in focusing on the work rather than the item – the intellectual expression as opposed to the physical document. The concept of “main entry” has no role in an electronic catalog. Any manifestation of a work can be a point of entry, not just a printed score. By focusing on the work, items which represent the same work can be collocated in a virtual world of bibliographic records, can be retrieved together, and finally displayed in a manner logical to the user.

This leads his discussion into the world of FRBR. The Group 1 entities defined by IFLA in FRBR are:

- Work – the distinct intellectual creation;
- Expression – the realization of that intellectual creation in semantic form;
- Manifestation – the embodiment of the expression in tangible form;
- Item – a physical embodiment of the manifestation.

Work and expression represent an intellectual or artistic construct, whereas manifestation and item represent a physical or tangible construct. (Smiraglia, 2002)

An example of a work may be Symphony No. 1 by Johannes Brahms. An expression of that work may be the notation of the symphony in a score, or a performance of the symphony. A manifestation of that expression may be a specific edition of the score issued by a certain publisher, or a specific performance of the symphony by a specific orchestra issued on a specific recording label. An item may be a physical copy of the score, or a physical (or digital) copy of the recording of the symphony.

By organizing both items in the catalog under a uniform title ensures that both items should be retrieved and displayed in search results for Brahms’ Symphony No. 1. The catalog will show that one entry is a score and one entry is a recording – a FRBRized catalog. Equal treatment is given to both items as manifestations of the work, while also revealing how each instantiation is unique and related to other search results.

As a work becomes part of the musical canon, and gains in popularity, it is inevitable that more mutations of the work occur. A piano reduction, an arrangement for solo guitar, recordings by new orchestras or new conductors, may all enter the scene. Smiraglia (2002) believes it is important to have an expansive definition of the work to include further manifestations or mutations. The key is to consider the user – a scholar, musician, or music editor – for whom it is important to see all manifestations of the same work collocated in one search display.

Pietras and Robinson (2012) further expand on the definition of a musical work, offering three views: Conceptual, editorial, and bibliographical. They present these views as ways that should all be considered when creating bibliographic records for musical resources.
First is the conceptual view, which considers the philosophical aspects of what constitutes a musical work. One considers if an arrangement is part of a bibliographic family (as defined by Smiraglia), or if it is a separate work. They reiterate the idea that music is ultimately an auditory experience, a performance. In addition, music is a cultural phenomenon, a product of the culture in which it is produced, but also a product of the culture in which it is received.

Second is the editorial view, which considers the issues of music editing and musicology. Editors require good cataloging in order to find all the resources related to a single work. In turn, catalogers need good editions of works, with good descriptions, in order to properly catalog resources. They question the notion of the urtext score (Pietras & Robinson, 2012), where one edition is considered to be superior based on editorial research and output. While it is important to represent the truest intentions of the composer (urtext), the work of music editors is still part of the process, and other editions still must be analyzed.

Finally they consider the bibliographical view. Librarians and catalogers must ultimately determine what constitutes instantiations of the same work, and create good bibliographic records that reveal the relationships between those instantiations. They recognize the potential of FRBR principles as a way to improve bibliographic control of musical resources. In addition, they recognize that the application of FRBR to the music domain may indeed provide further lessons for application to other subject areas.

FRBR IN THE MUSIC DOMAIN

Dickey (2008) addresses the value of FRBR relationships as a means to better collocate resources in the online catalog. Given the diverse nature of collections in music libraries, he believes the music domain may have the most to gain through the application of FRBR. Music resources tend to have multiple relationships to other resources, particularly when incorporating audiovisual resources with monographs and serials. These resources tend to form families in the bibliographic sense described by Smiraglia above.

FRBR provides a hierarchy of relationships which allow collocation of records in the interest of users. These relationships are then manifest in improved retrieval and improved navigation of retrieved results. Scores, recordings, books, and journals present a diverse array of formats which must be integrated.

Dickey (2008) outlines some specific issues related to the cataloging of music resources. For example, the 700t field in MARC records is used for the uniform work title. Authority control is required here for collocation. However, not all ILS systems recognize the 700t field, or properly interpret it in music retrieval. The 007 subfields are used to distinguish types of recordings, but again not all ILS systems properly utilize this information.
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AACR and AACR2 have tended to focus on the document as key, rather than the work. Users tend to search for a work, rather than an instantiation of the work, so it becomes important to reveal all instantiations of the work and the relationships between those instantiations. RDA, the successor to AACR2, is more focused on FRBR principles, but has so far been slow in its adoption. The use of FRBR not only presents clearer results, by focusing the search on the work, rather than a specific document, but can also lead to less redundancy of information in databases. Dickey (2008)

Dickey (2008) points out that the weakness of FRBR is that it is largely still theory, with few actual applications to date. He mentions specific examples of successful FRBR application, among them the National Library of Australia and the Royal Danish Library. There are some commercial and open-source software solutions which claim to FRBRize records, but he points out that these are so far less than successful as automation has so far been problematic and elusive. OCLC is in an ongoing process of developing practical solutions for FRBRizing existing records.

Dickey (2008) outlines the goals of FRBRization:

- To find all manifestations;
- To identify a work, and identify expressions and manifestations of that work;
- To select among works, among expressions, and among manifestations;
- To obtain a particular manifestation.

He outlines two processes in FRBRizing a catalog: 1) enhancing the existing catalog with bibliographic relationships to surface in retrieval, and 2) modifying the display interface to accommodate revealing these relationships. The first is the more formidable of the two, and is difficult to automate. Dickey (2008) OCLC, he mentions, has had difficulty in identifying relationships using existing MARC records. The process requires the use of specialized cataloging professionals.

Three technical solutions are offered up by Dickey (2008). The first is to incrementally improve MARC records with FRBR relationships. The second, which is perhaps most practical, is adding linking tags between MARC records. The third is to create entirely new metadata schemas, which is unlikely to occur.

FRBR APPLICATION: THE VARIATIONS PROJECT

As Dickey points out, there are to date few practical applications of FRBR. As Riley (2011) points out, there are even fewer applications with extensive documentation of the process. The music library at Indiana University has been developing a digital music library, first released in 1996.
The Variations project, as it is called, has been a federally-funded prototype for electronic organization of music libraries, and has been carefully documented at each step of the process.

The second phase of the project, known as Variations2, was released in 2005. This phase of the project resulted in work-based bibliographic records similar to FRBR, but not FRBR-based. The third phase, Variations3, released in 2009, sought to create a sustainable metadata model which could be further utilized by other institutions. This phase revealed that metadata should be more FRBR-based to meet user needs. (Riley, 2011)

By 2009 the Indiana team recognized the need for FRBRization, but also felt that a significant body of literature on FRBR theory had been developed so as to attempt a real-world application of FRBR. This resulted in their latest phase, known as Variations/FRBR, or V/FRBR, which was funded by the U.S. Institute of Museum and Library Services. Among the specific goals of the V/FRBR project were to not only provide a production implementation of FRBR, but also to develop a documented process for the conversion of records.

Again, Riley (2011) recognizes the benefits of FRBR application in the music domain, as Dickey (2008) has outlined, due to the diverse nature of the collection. Among the goals of V/FRBR were:

- Converting the existing data model to a new FRBRized data model;
- Developing an algorithm to convert legacy MARC records;
- Designing a new catalog interface to effectively utilize the FRBRized records with a user-centered approach.

Three XML Schemas were developed to organize this new data model. The first, known as “frbr,” was designed to include the entities, attributes, and relationships as described in FRBR. The second, known as “efrbr,” was designed for additional information to support description and discovery of items. The third schema, known as “vfrbr,” accommodated additional data specific to the music domain not outlined in FRBR. The metadata model also makes use of FRAD (Functional Requirements for Authority Data) and FRSAD (Functional Requirements for Subject Authority Data).

In the development of the algorithm for converting MARC records, and in the development of the XML Schemas for organizing the FRBRized records, the project aimed to provide a documented model that can be used by other institutions beyond Indiana. The data and project specifications are free and available for other institutions to utilize. The goal is to raise awareness of the challenges of FRBR implementation, as well as revealing its potential. The hope is that this implementation can lead to further implementations and eventually to the development of best practices in FRBR implementation. (Riley, 2011)
CONCLUSION

FRBRization of records shows great promise in improving the user experience and discovery of resources. This is particularly true in the music domain, where instances of the same work may appear in a variety of formats. FRBR allows for the collocation of records from a work-centered approach rather than a document-centered approach.

Although there is a growing body of scholarly literature regarding FRBR, there are as yet fewer examples of actual implementation, and still less documentation regarding those implementations that have occurred. The Variations project at Indiana University has been one of these implementations. Through the process of creating a digital music library, the value of FRBR became apparent. The librarians involved in the project have issued several papers regarding their experience, in the hopes that their processes and practices can help others see the potential but also the challenges in applying FRBR.

The FRBR model centers on the work. In the case of the musical work, there is a great deal of discussion as to what constitutes a musical work. Music is meant to be an auditory experience, making the performance perhaps the truest example of the musical work. The score also represents the work, in the sense that it represents the intentions of the composer in a semantic form that can be understood by others. A recording represents the work in that it conveys an interpretation of the work at a given time by a group of musicians.

The value in collocation of these different instantiations of the same work in a library catalog is to provide the optimal experience for the user. The application of the principles of FRBR allows for this collocation. The ideal experience for scholars, musicians, and music editors is in seeing all manifestations of a given work listed in one place. By displaying these manifestations and the relationships between them, users have the best chance of choosing the best resources for their purposes.

REFERENCES


